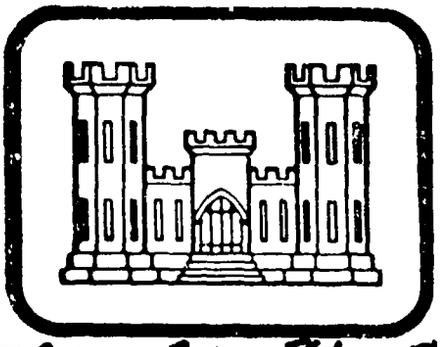
SUSQUEHANNA RIVER BASIN
STOUFFER LAKE DAM
LANCASTER – LEBANON COUNCIL INC. NO. 524
BOY SCOUTS OF AMERICA

NDI NO. PA-01011
DER NO. 38-082

LEBANON COUNTY, PENNSYLVANIA

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DACW 31-81-C-0013

PREPARED FOR

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

BY
Berger Associates
Harrisburg, Pennsylvania 17105

JULY 1981

PREFACE

This report has been prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITIONS
AND RECOMMENDATIONS

Name of Dam: STOUFFER LAKE DAM

State & State No.: PENNSYLVANIA, 38-082

County: LEBANON

Stream: TRIBUTARY TO TROUT RUN

Date of Inspection: JUNE 15, 1981

Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in fair condition.

In accordance with the Corps of Engineers' evaluation guidelines, the size classification of this dam is small and the hazard classification is high. These classifications indicate that the Spillway Design Flood (SDF) should be in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. The recommended SDF for this structure is one-half the PMF. The spillway capacity is adequate for passing 29 percent of the PMF peak inflow without overtopping the dam. Failure of the embankment due to overtopping by one-half of the PMF would not significantly increase the risk to loss of life downstream. The spillway, therefore, is considered to be inadequate, but not seriously inadequate.

The following recommendations are presented for immediate action by the owner:

1. That provisions be made to provide an adequate spillway capacity.

2. That the downstream slope and an area 10 feet beyond the toe be cleared of all trees and brush and be provided with a protective vegetative cover. The removal of trees should be under the direction of an engineer experienced in the design and construction of dams.

3. That the spillway weir and chute be repaired.

4. That a program be developed for regular maintenance of the embankment to prevent growth of brush and trees.

5. That the valve on the drawdown pipe be maintained and operated on a regular basis.

6. That provisions be made for upstream closure of the drawdown pipe in case of an emergency.

7. That a formal surveillance and downstream warning system be developed for use during periods of high or prolonged rainfall.

8. That an operation and maintenance manual be prepared for guidance in the operation of the dam during normal and emergency conditions, and that a schedule be developed for the annual inspection of the dam and its appurtenant structures.

SUBMITTED BY:

BERGER ASSOCIATES, INC.
HARRISBURG, PENNSYLVANIA

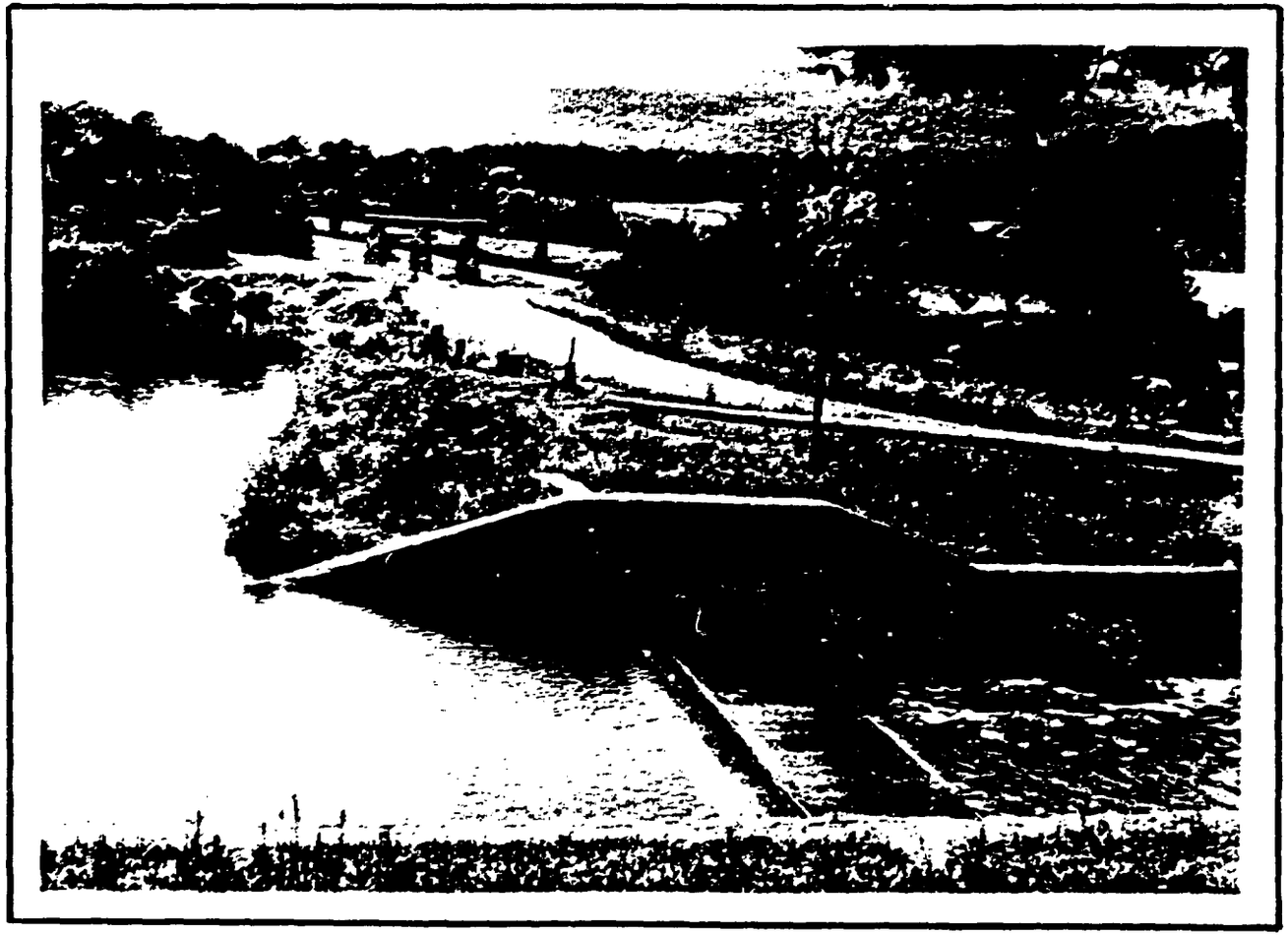
DATE: July 31, 1981

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
HENDRIK JONGSMA
ENGINEER
No. 5557E

APPROVED BY:

James W. Peck
Colonel, Corps of Engineers
Commander and District Engineer

DATE: 7 Aug 81



OVERVIEW

STOUFFER LAKE DAM

Photograph No. 1

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

STOUFFER LAKE DAM

NDI NO. PA-01011
DER NO. 38-082

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

A. Authority

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspections of dams throughout the United States.

B. Purpose

The purpose of this inspection is to determine if the dam constitutes a hazard to human life and property.

1.2 DESCRIPTION OF PROJECT

A. Description of Dam and Appurtenances

Note: The design drawings indicate a spillway crest elevation 532.00. The Phase I field inspection used a local U.S.G.S. benchmark elevation and surveyed the spillway crest elevation as 563.8. This elevation is used in this report.

Stouffer Lake Dam is located in the Bashore Boy Scout Reservation. The dam consists of a 335 foot long zoned earthfill embankment with a maximum embankment height of 18 feet above the creek bed at the downstream toe. A 50 foot wide spillway was excavated in the right abutment. The spillway has mortared stone abutment walls and a grouted stone slab. The Agnes storm in June 1972 destroyed the end of the spillway chute. This section was replaced with gabion walls and bottom. The drawdown facility consists of a 42-inch diameter pipe with a 24-inch valve located in a valve box on the downstream slope.

The crest of the dam is used as the access road to the camp. A bridge carries this road across the spillway.

B. Location:

Union Township, Lebanon County
U.S.G.S. Quadrangle - Indiantown Gap, PA
Latitude 40°-28.3', Longitude 76°-34.5'
Appendix E, Plates I & II

C. Size Classification: Small: Height - 18 feet
Storage - 57 acre-feet

D. Hazard Classification: High (Refer to Section 3.1.E.)

E. Ownership: Lancaster-Lebanon Council Inc., No. 524
Boy Scouts of America
Mr. James H. Connor
630 Janet Avenue
Lancaster, Pennsylvania 17601

F. Purpose: Recreation and fire protection

G. Design and Construction History

Construction drawings were prepared by Mr. Bernard L. Frick, P.E., Lebanon, Pennsylvania. A permit for construction of the facility was issued by the Pennsylvania Department of Natural Resources (PennDER) on December 9, 1947. Brown, Davis and White, Lebanon, Pennsylvania, the contractor, completed the construction in October 1949. On June 12, 1961, a permit was issued for construction of a bridge across the spillway and the widening of the crest of the dam for construction of a two lane roadway. This construction was completed by July 1962.

H. Normal Operating Procedures

The reservoir is used for boating and swimming. A normal pool level is desired for these purposes. All inflow above this level is discharged over the spillway. The valve on the drawdown pipe is opened annually to permit maintenance work on the beaches.

1.3 PERTINENT DATA

A. Drainage Area (square miles)

From files:	1.5
Computed for this report:	1.79
Use:	1.79

B. Discharge at Dam Site (cubic feet per second)
See Appendix D for hydraulic calculations.

Maximum known flood (based on records of stream gaging station on nearby Beck Creek)	1575
Outlet works at pool Elev. 563.8	52
Outlet works at low pool Elev. 555	27
Spillway capacity at pool Elev. 567.9 (low point of dam)	1611

C. Elevation (feet above mean sea level)

Top of dam (low point)	567.9
Top of dam (design crest)	567.8
Spillway crest	563.8
Upstream portal invert (design)	550.8
Downstream portal invert	549
Streambed at downstream toe of dam (estimate)	550

D. Reservoir (miles)

Length of normal pool (Elev. 563.8)	0.2
Length of maximum pool (Elev. 567.9)	0.3

E. Storage (acre-feet)

Spillway crest (Elev. 563.8)	26.1
Top of dam (Elev. 567.9)	57

F. Reservoir Surface (acres)

Spillway crest (Elev. 563.8)	6.1
Top of dam (Elev. 567.9)	10.4

G. Dam

Refer to Plates III and IV in Appendix E for plan and section.

Type: Zoned earthfill.

Length: 335 feet, not including the spillway.

Height: 18 feet.

Top Width: Design - 12 feet; Survey - 24 feet.

Side Slopes:

	Design	Surveyed
Upstream	3.0H to 1V	2.9H to 1V
Downstream	2.5H to 1V	2.8H to 1V

Zoning: Central clay core with more pervious material on the outside.

Cutoff:	Trench with a 12 foot bottom width excavated along the centerline of the dam. Average depth about 7 feet.
Grouting:	None.

H. Outlet Facilities

Type:	42-inch pipe through embankment with 24-inch valve.
Inlet:	550.8±
Location:	Center of dam.

I. Spillway

Type:	Concrete ogee section.
Length of Weir:	50 feet.
Crest Elevation:	563.8
Location:	Right abutment.

J. Regulating Outlets

See Section 1.3.H. above.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Engineering data for Stouffer Lake Dam are limited to a set of design drawings prepared by the designer and a report by PennDER upon the application of a permit for construction. The design drawings have been reproduced in reduced size in Appendix E. The report by PennDER states that the spillway capacity was calculated to be 1440 cfs for the four foot deep spillway. Preliminary discussions between PennDER and the owner stipulated most of the design features. A cutoff trench, anti-seepage collars on a drawdown pipe which was to be encased in concrete and cutoff walls at the spillway abutments were to be included in the construction details. The owners started excavation of a narrow trench in 1947, prior to obtaining a permit for construction. This four foot wide, 7.5 foot deep trench showed that the overburden consisted of four to six feet of impervious material.

2.2 CONSTRUCTION

Reports by pennDER indicate that the final trench was excavated to firm shale. The construction was substantially completed in October 1949. Dressing of the slopes was not completed at that time. The outlet pipe was extended only 20 feet beyond the valve at the downstream toe. The clay blanket under the upstream section of the embankment was deleted due to the presence of impervious overburden in this area. The spillway was located ten feet further east to encounter a better shale foundation. An inspection report dated February 1950 indicates that the upstream slope protection had not yet been completed.

2.3 OPERATION

Records of operation are not maintained by the owner. Reports indicate that the reservoir was lowered in 1953 to permit the installation of a diving pier and beach facilities. The reservoir level was lowered several other times for maintenance purposes. A letter by the owner dated August 29, 1973, indicates that water was seeping through cracks in the spillway weir. It was reported that water flowing in the spillway chute disappeared through cracks and holes; also, that the Agnes storm had damaged the end of the spillway chute, resulting in a deep hole developing at the end.

2.4 EVALUATION

A. Availability

The available engineering and construction data are located in the PennDER files in Harrisburg, Pennsylvania. Duplications of the drawings are available in the files of the owner.

B. Adequacy

The available data, combined with the visual inspection, are considered to be adequate for a reasonable assessment of the facilities.

C. Operating Records

Formal operating records have not been maintained by the owner.

D. Post Construction Changes

In May 1961, an application was filed requesting a permit for construction of a one-lane bridge over the spillway about 50 feet downstream of the weir. The crest would be widened for a two-lane, 18 feet wide paved roadway. Additional fill was to be placed on the downstream slope for this widening and a manhole was to be constructed for the valve. A permit was issued on June 12, 1961 and the construction was inspected in July 1962.

Washouts of the spillway chute occurred in June 1972 (Agnes). Repairs were made by volunteers in 1978 by placing gabions in the damaged area.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

A. General

The general appearance of Stouffer Lake Dam is fair. The crest of the dam is wide and has a bituminous roadway surface over most of its length. The downstream slope has a heavy cover of weeds, brush, and trees. There were no signs of sloughs, slides, or seepage. The spillway appeared to be adequately repaired.

The visual inspection check list and sketches of the general plan and profile of the dam, as surveyed during the inspection, are presented in Appendix A of this report. Photographs of the facilities taken during the inspection are reproduced in Appendix C.

Mr. George Anderson represented the owner during the inspection of the facilities.

B. Embankment

The dam was constructed on a straight alignment. The construction of the road gives the appearance of a curved alignment. The upstream slope has no riprap and is covered with grass and weeds (Photograph No. 1). The downstream slope is, for most of its surface, covered with weeds, brush, and evergreens (Photographs No. 3 and 4). The dense cover prevented close observation; however, no indications of sloughs, slides, or seepage were detected.

Two wet spots were noted about 30 feet downstream of the toe of the embankment. These areas were in depressions and the water present appears to be the result of poor surface drainage.

C. Appurtenant Structures

The spillway is located in the right abutment. The concrete ogee section has deteriorated, exposing the aggregate. A 3-inch hole near the right abutment wall (Photograph No. 8) indicates poor concrete quality. Water was flowing from this hole and other large cracks on the spillway.

The walls for the forebay area and the spillway were constructed from mortared stone. They appeared to be in good condition. The bridge over the spillway is downstream of the ogee section and will not create an obstruction to the spillway capacity. The spillway chute has several vertical steps along its length (Photograph No. 10). The owner's representative stated that the Agnes flood washed out the downstream end of the spillway chute. Repairs have been made using gabions for the bottom

and the walls (Photograph No. 9). It appeared that the upper section of the grouted rock chute slab has several holes and cracks and that water could flow beneath and subsequently undermine this section.

The downstream outlet pipe is a 42-inch diameter CMP. The end is partially exposed (Photograph No. 5). The valve box containing the control valve is located on the downstream embankment slope. The cover on the valve box is heavy and secured by clamps. The owner's representative stated that the valve is operated annually to lower the pool level for maintenance of beaches.

D. Reservoir Area

The reservoir is surrounded by gentle grassed slopes. The immediate area on the east side of the reservoir is used for camping and other Boy Scout activities. The slopes of the reservoir appear to be stable.

E. Downstream Channel

The downstream channel beyond the spillway chute was graded to meet the natural stream. A single span bridge, carrying Route 443, crosses the creek about 300 feet downstream of the dam. The slopes of the channel are moderate. The tributary joins Trout Run about 400 feet farther downstream. Three homes are located along this stream within a distance of 1800 feet from the dam. A potential hazard to loss of life exists downstream if the dam fails. The possible loss of life is estimated to be more than a few. The hazard category is therefore considered to be "High."

3.2 EVALUATION

The overall visual evaluation of the facilities indicates that Stouffer Lake Dam is in fair condition. It is recommended that the spillway weir be repaired to prevent further erosion. Trees and brush on embankments are detrimental to the safety of the structure and should be removed. To prevent further uplift of the bottom of the spillway outlet channel, it is recommended that the stone be secured with grout.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

Stouffer Lake Dam was constructed for recreational and fire protection purposes. A normal pool level is desired. All inflow above this level is discharged over the spillway. The valve on the drawdown pipe is operated on an annual basis to accommodate maintenance of the beaches.

4.2 MAINTENANCE OF EMBANKMENT

The inspection indicates that maintenance procedures for the embankment do not exist. Weeds, brush and trees cover the embankment slopes.

4.3 MAINTENANCE OF OPERATING FACILITIES

The only operating facility is the 24-inch valve on the drawdown pipe. Although this valve is operated regularly, there are no indications of maintenance procedures.

4.4 WARNING SYSTEM

There is no formally organized surveillance and downstream warning system in existence at the present time.

4.5 EVALUATION

The operational procedures for Stouffer Lake Dam are minimal. It is recommended that a program be developed for maintenance of the downstream and upstream slopes and the regular maintenance of the drawdown valve. A formal surveillance plan and downstream warning system should be developed for implementation during periods of heavy or prolonged rainfall.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

A. Design Data

The hydrologic and hydraulic analysis available from PennDER for Stouffer Lake Dam was not very extensive. No area-capacity curve, frequency curve, unit hydrograph, design storm, design flood hydrograph, or flood routings were available.

B. Experience Data

There are no records of flood levels at Stouffer Lake Dam. It was reported that the June 1972 flood was the maximum flood and caused considerable damage to the spillway. Based on records of the U.S.G.S. stream gage on Beck Creek at nearby Cleona, Pennsylvania, this storm produced a maximum inflow to Stouffer Lake Dam estimated at 1575 cfs.

C. Visual Observations

No conditions were observed that would indicate that the appurtenant structures of the dam could not operate satisfactorily until the dam is overtopped.

D. Overtopping Potential

Stouffer Lake Dam has a total storage capacity of 57 acre-feet and an overall height of 18 feet above streambed. These dimensions indicate a size classification of "Small." The hazard classification is "High" (see Section 3.1.E.).

The recommended Spillway Design Flood (SDF) for a dam having the above classifications is in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. Because of the small storage capacity of this dam and the small population downstream, the recommended SDF is one-half the PMF. For this dam, the SDF peak inflow is 2781 cfs (see Appendix D for HEC-1 inflow computations).

Comparison of the estimated SDF peak inflow of 2781 cfs with the estimated spillway discharge capacity of 1611 cfs indicates that a potential for overtopping of the Stouffer Lake Dam exists.

An estimate of the storage effect of the reservoir and routing of the computed inflow hydrograph through the reservoir shows that this dam has the necessary storage available to pass only 29% of the PMF without overtopping, based on the existing low point in the dam profile.

E. Dam Break Evaluation

The calculations to determine the behavior of the dam in the event of an overtopping and a resulting breaching of the embankment indicates that there will not be a substantial increase in water levels downstream from the dam.

Several homes are located about 1800 feet downstream from the dam. On the basis of the results of the dam break analysis, using the U.S. Army Corps of Engineers HEC-1 program, the water surface elevations in the vicinity of the homes have been compared for several conditions prior to and after a dam break (refer to Table 1, Appendix D). For an earth dam, it is estimated that 0.5 foot of overtopping would result in a breach. Calculations indicate that 39 percent of the PMF inflow would cause an overtopping of 0.5 foot. The increase in water levels downstream due to overtopping of 0.5 foot with no failure as compared to no overtopping would be 0.4 foot. While more property would be exposed to flooding, the increase in the hazard to loss of life is not considered significant. With failure, the breaching analysis indicates a rise of 1.4 feet above the flow level just prior to breach when considering a .25 hour time to complete the breach and only 0.1 foot rise above the flow level just prior to breach when considering a 2 hour time to complete. The increase in hazard to loss of life and property damage is reflected in an increase in depth of water of 1.4 feet in the 15 minute breach and 0.1 foot in the 2 hour breach.

Being an earth embankment, it is judged that the breach would be completed between the 15 minute and the two hour period. The numerical difference of water levels is 1.3 foot. The property damage would be similar with either time of failure. The time factor, however, is most significant regarding loss of life. Calculations indicate that the water depth will increase at a rate of 1.4 feet in 15 minutes under the .25 hour breach condition.

On the basis of these calculations, it is concluded that the hazard to loss of life and property damage is not significantly increased when the dam is overtopped and failed as compared to the condition just prior to failure.

Refer to Table 1, Appendix D, for comparison of flood water levels.

F. Spillway Adequacy

Calculations show that the spillway discharge capacity and reservoir storage capacity combine to handle 29% of the PMF (refer to Appendix D).

Since the spillway discharge and reservoir storage capacity cannot pass one-half of the PMF, the downstream hazard to loss of life is high, and this hazard is not significantly increased when the dam

fails as compared to just prior to failure; the spillway is therefore judged to be inadequate, but not seriously inadequate.

The hydrologic analysis for this investigation was based upon existing conditions of the watershed. The effects of future development were not considered.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

A. Visual Observations

1. Embankment

The visual inspection of Stouffer Lake Dam did not detect any signs of seepage through the embankment. There were no indications of sloughs or slides. However, dense growth prevented close observation. The general appearance indicates a stable structure with adequate slopes for the height of embankment under consideration. With a saturated embankment condition, the trees could, however, cause a stability problem.

2. Appurtenant Structures

The spillway weir shows signs of deterioration. Water flowing through holes and cracks indicates a poor concrete quality. Repairs to prevent future problems are recommended.

B. Design and Construction Data

1. Embankment

Reports indicate that clay was available for the central core of the dam. The typical section (Plate IV, Appendix E) indicates a cutoff trench and a downstream rock toe. The upstream clay blanket was not installed and the rock toe has been covered by new fill for the road construction. A construction photograph shows that small stone was used for the upstream slope protection.

2. Appurtenant Structures

The drawdown pipe has a headwall and trashrack at the upstream end. The 42-inch pipe was partially plugged at the downstream end after construction was completed and a 24-inch control valve was installed. The pipe under the embankment was encased in concrete and provided with two anti-seepage collars. The downstream outlet is a 42-inch CMP rather than the concrete pipe encased in concrete shown on the drawing. A photograph shows that the valve was exposed and not placed in a manhole as shown on the drawing. The valve box was not installed until 1961 when the additional embankment fill was placed. The spillway was excavated in the right abutment and placed on shale. An upstream and a downstream cutoff wall is indicated on the drawings. The spillway walls and cutoff walls in the chute are gravity type sections and are provided with weep holes.

C. Operating Records

Operating records for this dam have not been maintained by the owner.

D. Post Construction Changes

Reference is made to Section 2.4.D. for a discussion of post construction changes.

E. Seismic Stability

This dam is located in Seismic Zone 1, and it is considered that the static stability is sufficient to withstand minor earthquake-induced dynamic forces. No studies or calculations have been made to confirm this assumption.

SECTION 7 - ASSESSMENT AND RECOMMENDATIONS

7.1 DAM ASSESSMENT

A. Safety

The visual inspection indicates that Stouffer Lake Dam is in fair condition. Engineering design and construction data indicate that the dam was designed in accordance with acceptable engineering standards. The embankment appears stable but requires improved maintenance procedures. The spillway weir shows signs of deterioration and should be protected against further erosion.

In accordance with the Corps of Engineers' evaluation guidelines, the size classification of this dam is small and the hazard classification is high. These classifications indicate that the Spillway Design Flood (SDF) should be in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. The recommended SDF for this structure is one-half the PMF.

The hydrologic and hydraulic computations indicate that the combination of storage capacity and the discharge capacity of the spillway is adequate for passing only 29 percent of the PMF. Failure of this dam due to overtopping would not significantly increase the hazard to life downstream. The spillway is therefore considered to be inadequate, but not seriously inadequate.

B. Adequacy of Information

The available information, combined with the visual inspection, are considered to be sufficiently adequate for making a reasonable assessment of this dam.

C. Urgency

The recommendations presented below should be implemented immediately.

D. Additional Studies

Additional studies are not required at this time if the recommendations are implemented immediately.

7.2 RECOMMENDATIONS

In order to assure the continued satisfactory operation of this dam, the following recommendations are presented for immediate implementation by the owner:

1. That provisions be made to provide an adequate spillway capacity.

2. That the downstream slope and an area 10 feet beyond the toe be cleared of all trees and brush and be provided with a protective vegetative cover. The removal of trees should be under the direction of an engineer experienced in the design and construction of dams.

3. That the spillway weir and chute be repaired.

4. That a program be developed for regular maintenance of the embankment to prevent growth of brush and trees.

5. That the valve on the drawdown pipe be maintained and operated on a regular basis.

6. That provisions be made for upstream closure of the drawdown pipe in case of an emergency.

7. That a formal surveillance and downstream warning system be developed for use during periods of high or prolonged rainfall.

8. That an operation and maintenance manual be prepared for guidance in the operation of the dam during normal and emergency conditions, and that a schedule be developed for the annual inspection of the dam and its appurtenant structures.

CHECK LIST

PHASE I - VISUAL INSPECTION REPORT

PA DER # 38-082 NDI NO. PA-00001011

NAME OF DAM Stouffer Lake HAZARD CATEGORY High

TYPE OF DAM Earth Embankment

LOCATION Union TOWNSHIP Lebanon COUNTY, PENNSYLVANIA

INSPECTION DATE 6-15-81 WEATHER Sunny-Warm Humid TEMPERATURE 80's-90's

INSPECTORS: R. Houseal (Recorder) OWNER'S REPRESENTATIVE(s):

H. Jongsma George Anderson

R. Shireman

A. Bartlett

NORMAL POOL ELEVATION: 563.8 AT TIME OF INSPECTION:

BREAST ELEVATION: 567.9 POOL ELEVATION: 563.84

SPILLWAY ELEVATION: 563.8 TAILWATER ELEVATION:

MAXIMUM RECORDED POOL ELEVATION: One ft. over spillway (Agnes 1972)

GENERAL COMMENTS:

NDI NO. PA-XXX 01011

VISUAL INSPECTION
EMBANKMENT

	OBSERVATIONS AND REMARKS
A. SURFACE CRACKS	None observed.
B. UNUSUAL MOVEMENT BEYOND TOE	None Observed.
C. SLOUGHING OR EROSION OF EMBANKMENT OR ABUTMENT SLOPES	No sloughs observed. Some slight erosion toward downstream slope from edge of roadway.
D. ALIGNMENT OF CREST: HORIZONTAL: VERTICAL:	Horizontal - straight. Vertical - See Plate A-II.
E. RIPRAP FAILURES	No riprap observed.
F. JUNCTION EMBANKMENT & ABUTMENT OR SPILLWAY	All abutments appear to be sound.
G. SEEPAGE	No seepage observed. Two wet spots noted downstream from downstream toe of embankment.
H. DRAINS	None.
J. GAGES & RECORDER	None.
K. COVER (GROWTH)	Stone paved road surface on crest. Upstream: grass and weed growth. Downstream: weed growth, brush and evergreen trees.

NDI NO. PA-[illegible] 01011

VISUAL INSPECTION
OUTLET WORKS

	OBSERVATIONS AND REMARKS
A. INTAKE STRUCTURE	Submerged - Could not observe.
B. OUTLET STRUCTURE	42" ∅ CMP.
C. OUTLET CHANNEL	Natural stream.
D. GATES	24" valve located on d/s in manhole. Used for drawdown.
E. EMERGENCY GATE	See D. above.
F. OPERATION & CONTROL	Opened annually for beach maintenance.
G. BRIDGE (ACCESS)	None.

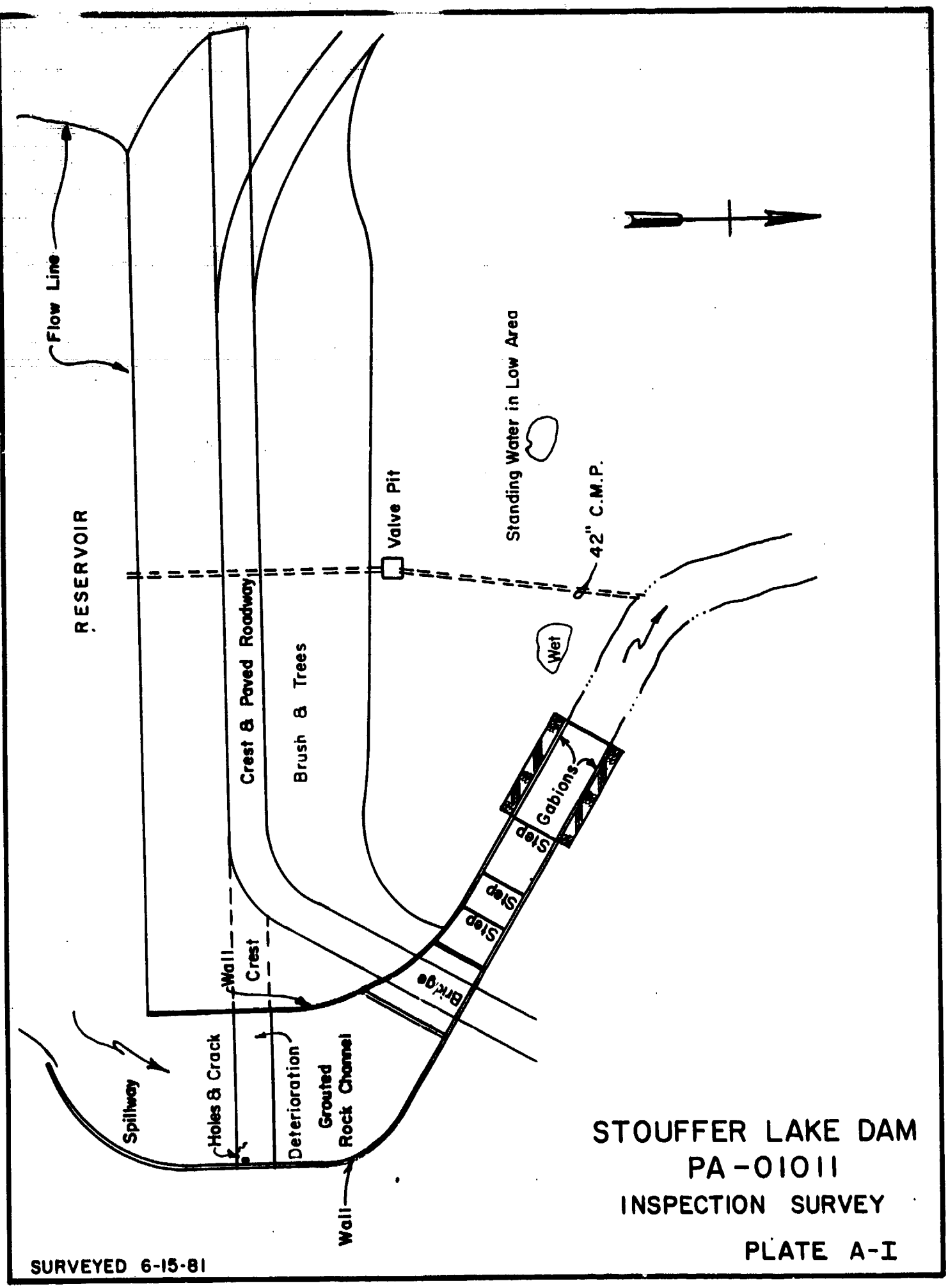
NDI NO. PA-88 01011

VISUAL INSPECTION
SPILLWAY

	OBSERVATIONS AND REMARKS
A. APPROACH CHANNEL	Directly from right side of reservoir.
B. WEIR: Crest Condition Cracks Deterioration Foundation Abutments	Concrete Ogee section. Condition: Aggregate exposed and some cavities on surface. One hole in ogee thru ogee section.
C. DISCHARGE CHANNEL: Lining Cracks Stilling Basin	Rock lined with masonry walls. Three steps in channel as it descends to the natural stream channel. Gabion walls and channel bottom d/s from masonry walls-recently added. Walls in good condition. Some displacement of rock in channel bottom.
D. BRIDGE & PIERS	Single span bridge over the outlet channel.
E. GATES & OPERATION EQUIPMENT	None.
F. CONTROL & HISTORY	None.

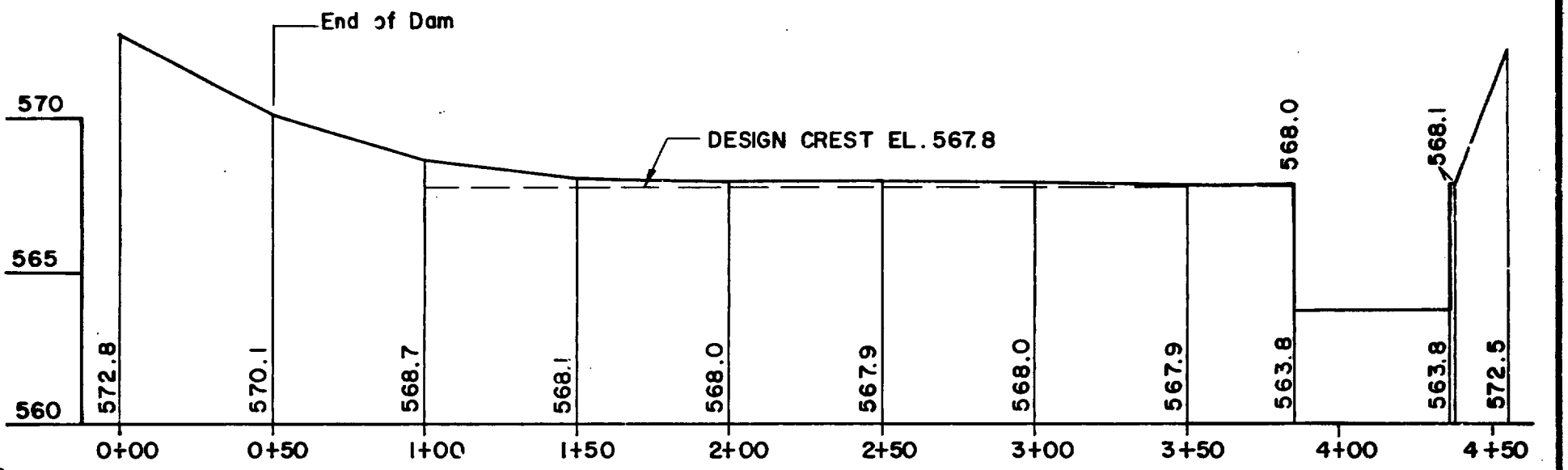
VISUAL INSPECTION

	OBSERVATIONS AND REMARKS
INSTRUMENTATION Monumentation	None.
Observation Wells	None.
Weirs	None.
Piezometers	None.
Staff Gauge	None.
Other	None.
RESERVOIR Slopes	Grass and woodlands.
Sedimentation	None reported.
Watershed Description	Mostly woodlands.
DOWNSTREAM CHANNEL Condition	Natural stream.
Slopes	Wooded - Moderate
Approximate Population	10±
No. Homes	3 Homes within 1,800 feet.

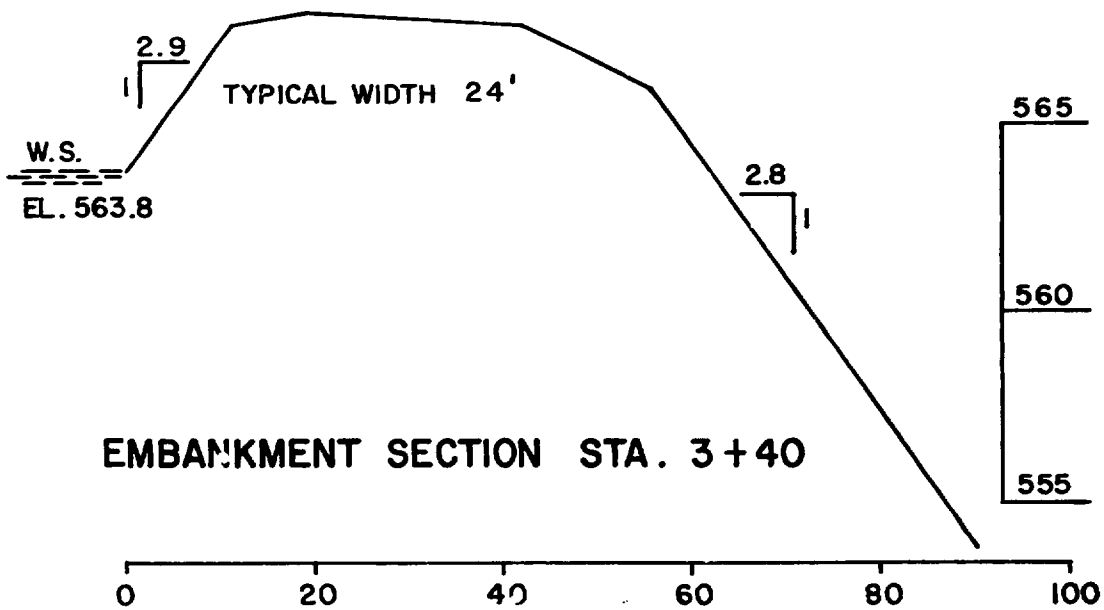


STOUFFER LAKE DAM
PA-01011
INSPECTION SURVEY
PLATE A-I

SURVEYED 6-15-81



EMBANKMENT PROFILE



EMBANKMENT SECTION STA. 3+40

STOUFFER LAKE DAM
PA-01011
INSPECTION SURVEY

SURVEYED 6-15-81

PLATE A-II

APPENDIX B

CHECK LIST OF ENGINEERING DATA

CHECK LIST
ENGINEERING DATA

PA DER # 38-082 NDI NO. PA-01011

NAME OF DAM Stouffer Lake Dam

ITEM	REMARKS
AS-BUILT DRAWINGS	Not available.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle - Indiantown Gap, PA See Plate II, Appendix E
CONSTRUCTION HISTORY	Permit for construction issued December 9, 1947. Contractor: Brown, Davis & White, Lebanon, PA. Completion: October 1944. Crest widened and bridge over spillway added in 1961.
GENERAL PLAN OF DAM	Plate III, Appendix E, prior to construction of roadway on crest.
TYPICAL SECTIONS OF DAM	Plate IV, Appendix E.
OUTLETS: PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	 Plate III, Appendix E. Plate IV, Appendix E. 24-inch valve on downstream toe. Not available.

ENGINEERING DATA

ITEM	REMARKS
RAINFALL & RESERVOIR RECORDS	No records.
DESIGN REPORTS	Not available. Considerable design guidance given by PennDER during preliminary stage of design.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS: HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	 None. None. None.
MATERIALS INVESTIGATIONS: BORING RECORDS LABORATORY FIELD	None. Three test pits were excavated. Results are unknown.
POST CONSTRUCTION SURVEYS OF DAM	Some survey done in 1961 for widening the crest and to construct the bridge.
BORROW SOURCES	Unknown.

ENGINEERING DATA

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Crest widened by placing fill on downstream slope. Part of washed out spillway replaced by gabions in 1978.
HIGH POOL RECORDS	No records.
POST CONSTRUCTION ENGINEERING STUDIES & REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM Description: Reports:	None.
MAINTENANCE & OPERATION RECORDS	None.
SPILLWAY PLAN, SECTIONS AND DETAILS	Plate V, Appendix E.

NDI NO. PA- 01011

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT, PLANS & DETAILS	One 24-inch valve on drawdown pipe.
CONSTRUCTION RECORDS	No records, except a report upon inspection of the excavation for cutoff trench.
PREVIOUS INSPECTION REPORTS & DEFICIENCIES	PennDER inspection reports.
MISCELLANEOUS	

NDI NO. PA-01011

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: woodland

ELEVATION:

TOP NORMAL POOL & STORAGE CAPACITY: Elev. 563.8 Acre-Feet 26.1

TOP FLOOD CONTROL POOL & STORAGE CAPACITY: Elev. 567.9 Acre-Feet 57

MAXIMUM DESIGN POOL: Elev. 567.8

TOP DAM: Elev. 567.9

SPILLWAY:

a. Elevation 563.8

b. Type concrete ogee section

c. Width 50 feet

d. Length --

e. Location Spillover right abutment

f. Number and Type of Gates none

OUTLET WORKS:

a. Type 24-inch slide gate on 42-inch pipe

b. Location center of dam

c. Entrance inverts 550.8±

d. Exit inverts 549

e. Emergency drawdown facilities pipe with slide gate

HYDROMETEOROLOGICAL GAGES:

a. Type none

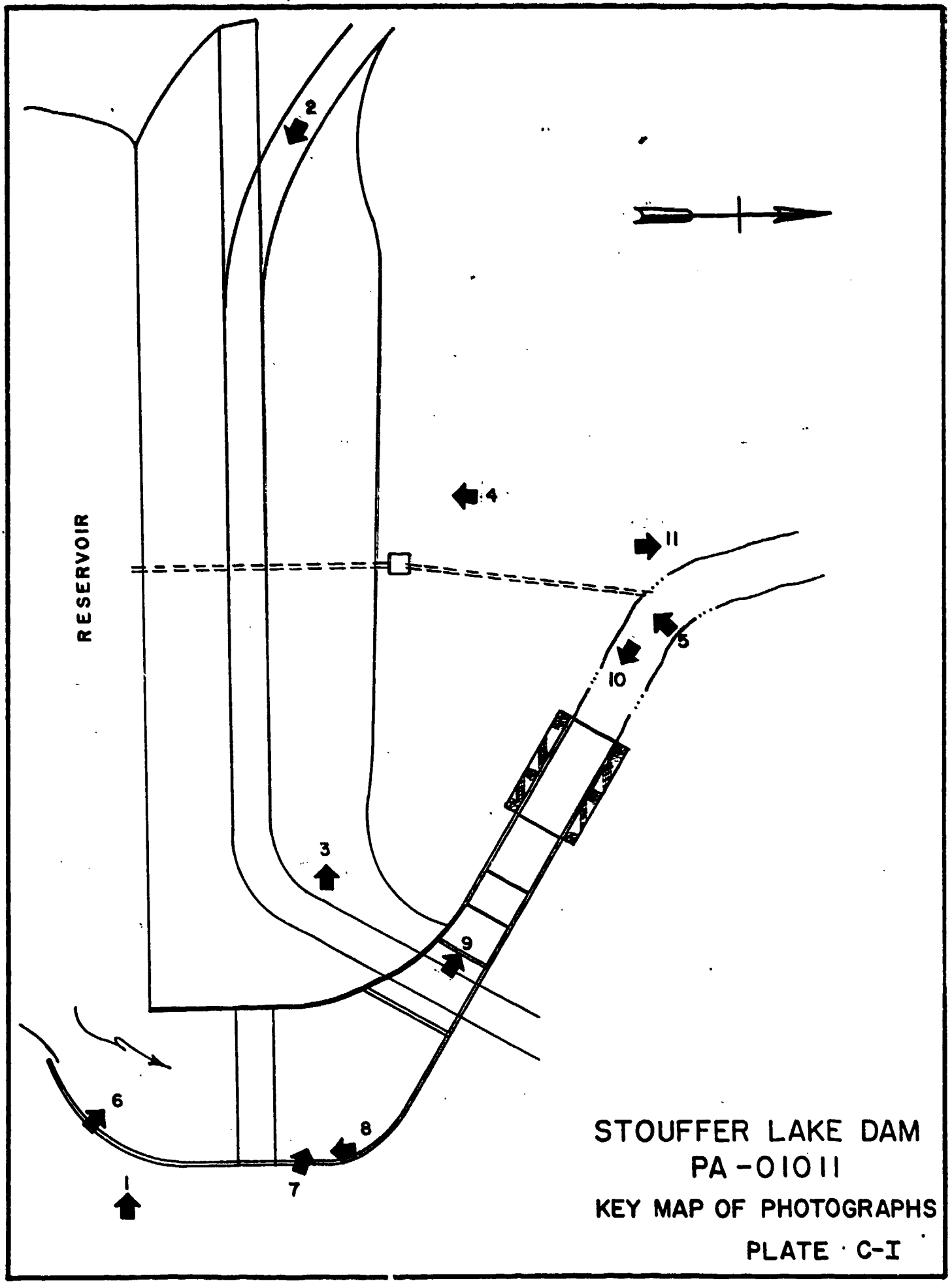
b. Location

c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 1611 cfs

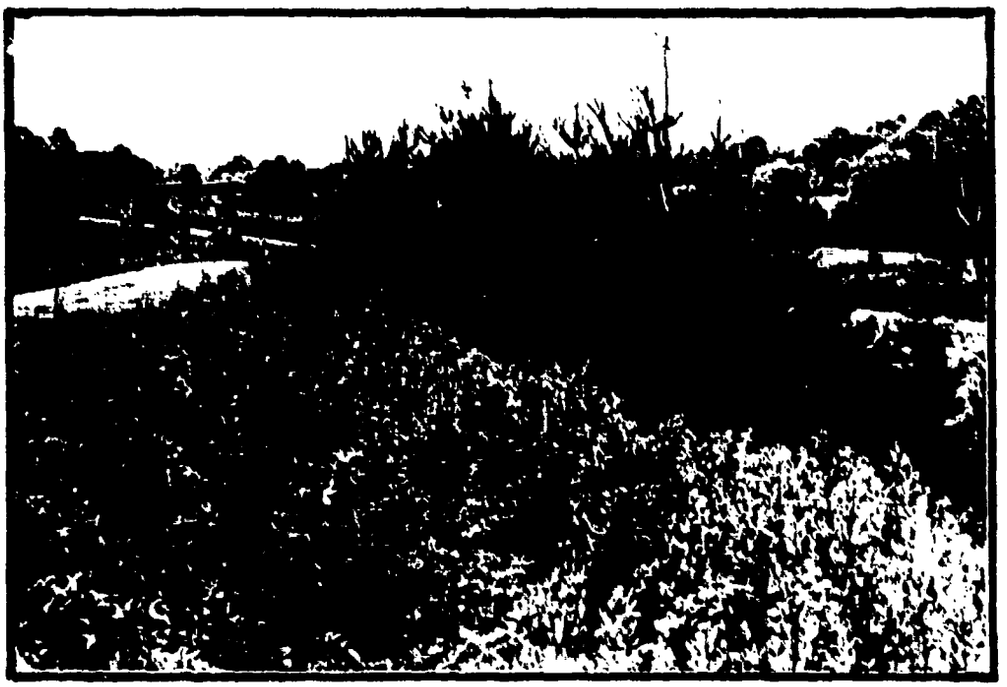
APPENDIX C

PHOTOGRAPHS



STOUFFER LAKE DAM
PA-01011
KEY MAP OF PHOTOGRAPHS
PLATE C-I

OVERVIEW FROM LEFT ABUTMENT NO. - 2

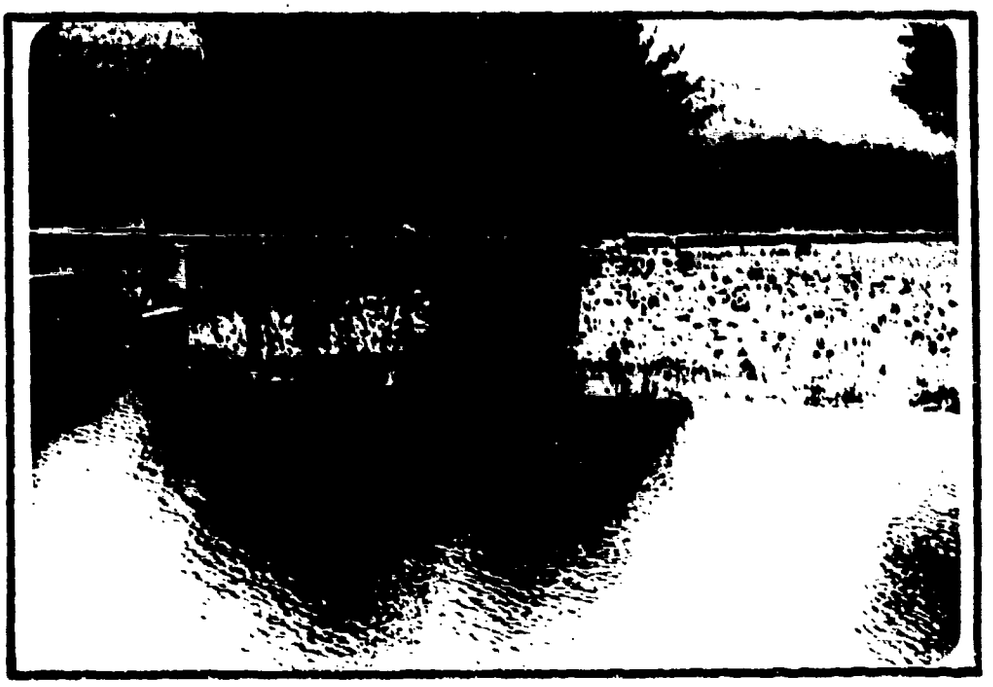


DOWNSTREAM SLOPE NO. - 3
NOTE: TREES AND BRUSH

TREES AND BRUSH ON DOWNSTREAM SLOPE NO. - 4

OUTLET OF DRAWDOWN LINE NO. - 5

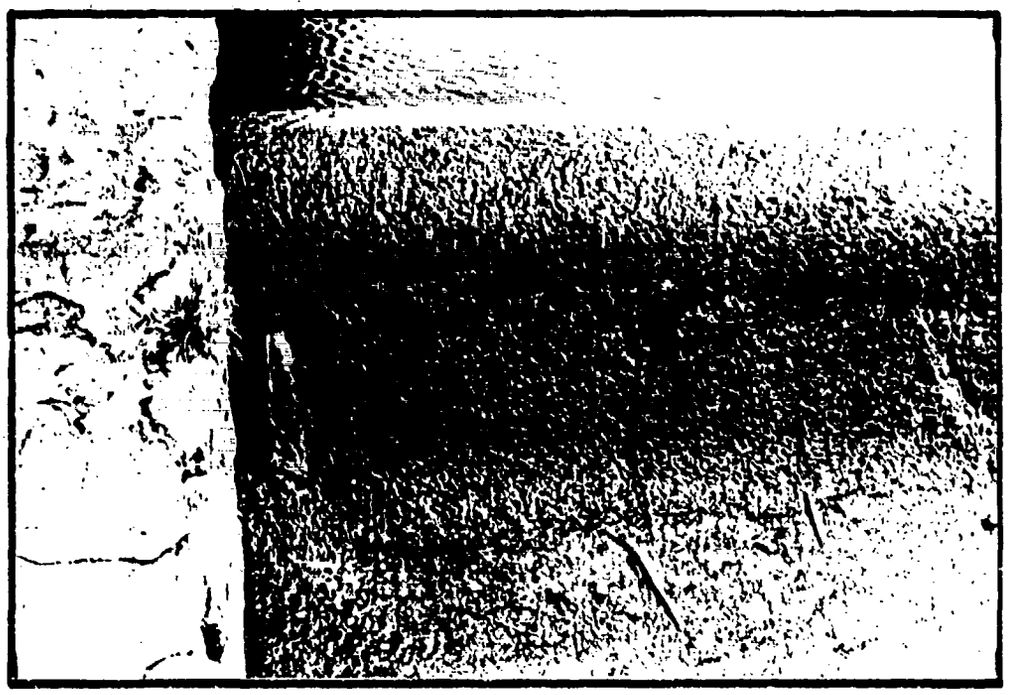
PA-01011
Plate C-III



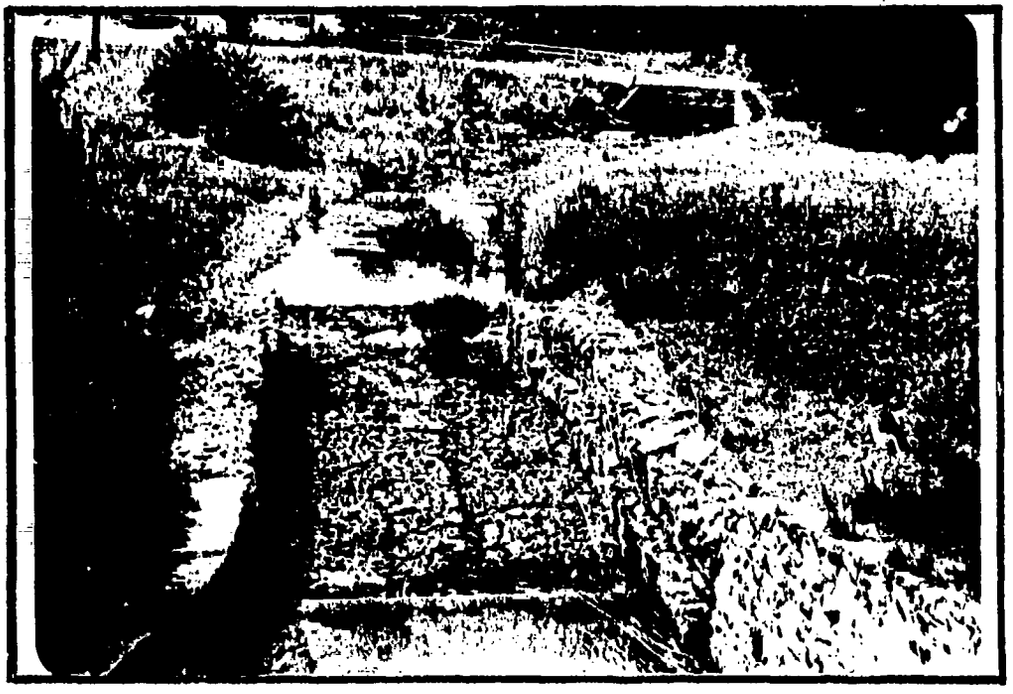
SPILLWAY FOREBAY AREA NO. - 6

DISCHARGE CHANNEL OF SPILLWAY NO. - 7

PA-01011
Plate C-IV



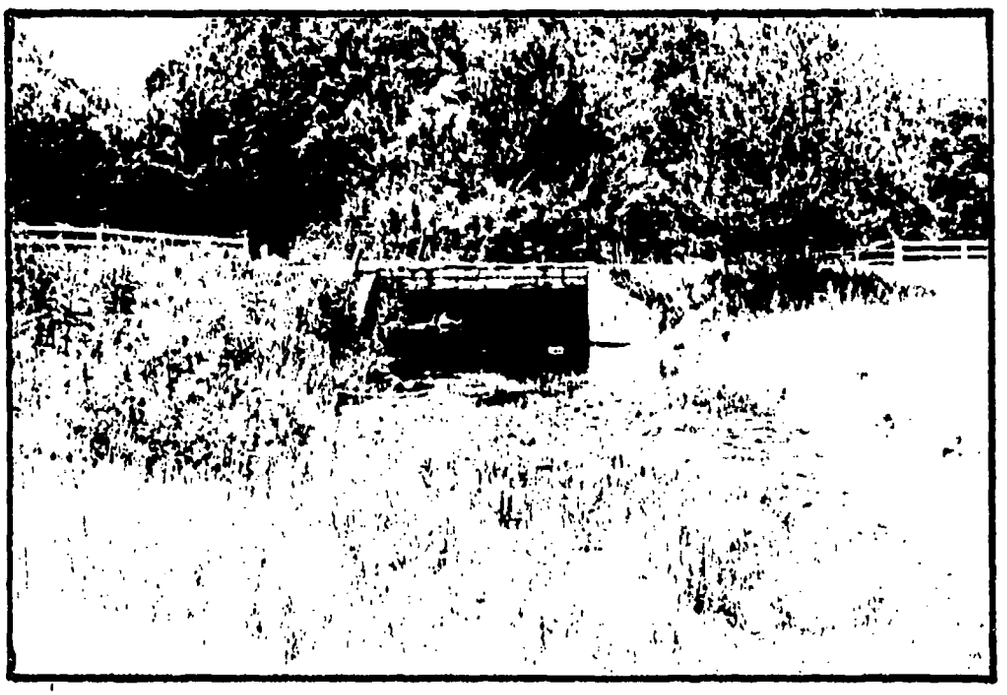
DETAIL OF OGEE SPILLWAY NO. - 8
NOTE: FLOW OF WATER FROM HOLE



END OF SPILLWAY CHANNEL WITH GABIONS NC. - 9

PA-01011
Plate C-V

SPILLWAY DISCHARGE CHANNEL, LOOKING UPSTREAM NO. - 10



ROADWAY BRIDGE OVER CHANNEL NO. - 11

PA-01011
Plate C-VI

APPENDIX D

HYDROLOGY AND HYDRAULIC CALCULATIONS

SUMMARY DESCRIPTION
OF
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION

The hydrologic and hydraulic evaluation for this inspection report has employed computer techniques using the Corps of Engineers computer program identified as the Flood Hydrograph Package (HEC-1) Dam Safety Version.

The program has been designed to enable the user to perform two basic types of hydrologic analyses: (1) the evaluation of the overtopping potential of the dam, and (2) the capability to estimate the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. A brief summary of the computation procedures typically used in the dam overtopping analysis is shown below.

- Development of an inflow hydrograph to the reservoir.
- Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.
- Routing of the outflow hydrograph(s) of the reservoir to desired downstream locations. The results provide the peak discharge and maximum stage of each routed hydrograph at the outlet of the reach.

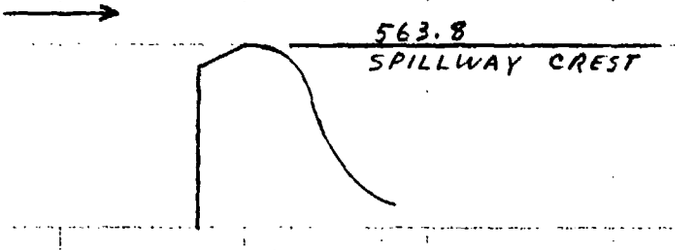
The output data provided by this program permits the comparison of downstream conditions just prior to a breach failure with that after a breach failure and the determination as to whether or not there is a significant increase in the hazard to loss of life as a result of such a failure.

The results of the studies conducted for this report are presented in Section 5.

For detailed information regarding this program refer to the Users Manual for the Flood Hydrograph Package (HEC-1) Dam Safety Version prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California.

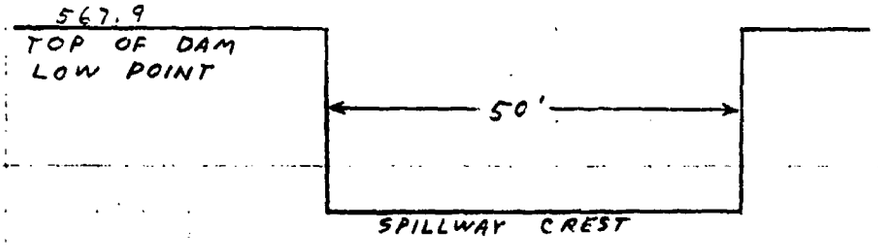
BY RLS DATE 7/1/81 **BERGER ASSOCIATES** SHEET NO. 1 OF 7
CHKD. BY DATE PROJECT 00590
SUBJECT STOUFFER LAKE DAM

SPILLWAY RATING



OGEE SECTION

C = 3.88 (SMALL DAMS, FIG. 249)



$Q = C L H^{3/2}$

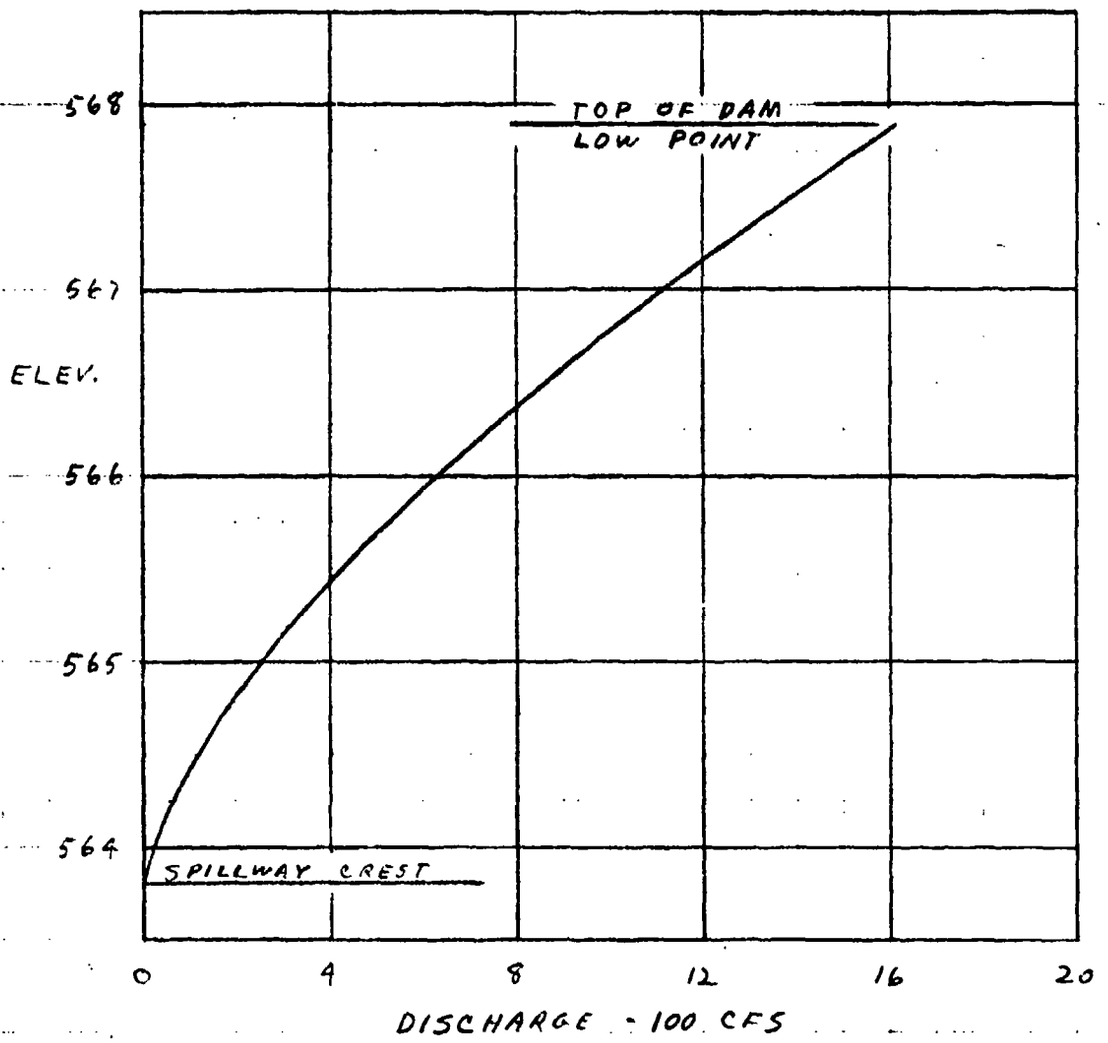
$H = 567.9 - 563.8 = 4.1'$

$Q = 3.88 \times 50 \times (4.1)^{1.5}$

$= 1611$ CFS

BY RLS DATE 7/1/81 **BERGER ASSOCIATES** SHEET NO. 2 OF 7
CHKD. BY DATE PROJECT D0590
SUBJECT STOUFFER LAKE DAM

SPILLWAY RATING CURVE



DISCHARGE THROUGH OUTLET WORKS

42" DIAMETER PIPE WITH 24" GATE VALVE

C = 0.6 (KING'S HDBK)

ORIFICE INVERT = 550.8 ±

$Q = C A \sqrt{2gH}$

AT POOL ELEV 563.8

$H = 563.8 - 551.8 = 12'$

$Q = 0.6 \times \pi \times (2)^2/4 \times (2 \times 32.2 \times 12)^{0.5}$

$= 52$ CFS

AT LOW POOL ELEV 555

$H = 555 - 551.8 = 3.2'$

$Q = 0.6 \times \pi \times (2)^2/4 \times (2 \times 32.2 \times 3.2)^{0.5}$

$= 27$ CFS

MAXIMUM KNOWN FLOOD AT DAMSITE

THERE ARE NO RECORDS OF FLOOD LEVELS AT STOUFFER LAKE DAM. IT WAS REPORTED THAT THE JUNE 1972 STORM PRODUCED THE MAXIMUM DISCHARGE, WHICH CAUSED CONSIDERABLE DAMAGE. BASED ON THE GAGE RECORDS FOR BECK CREEK AT NEARBY CLEONA, PA. (D.A. = 7.87 SQ.MI.) THIS STORM PRODUCED A FLOW OF 5150 CFS. THE MAXIMUM INFLOW TO STOUFFER LAKE IS ESTIMATED TO BE:

$$\left(\frac{1.79}{7.87}\right)^{0.8} \times 5150 = 1575 \text{ CFS}$$

DESIGN FLOOD

SIZE CLASSIFICATION
MAXIMUM HEIGHT = 18 FEET
MAXIMUM STORAGE = 57 ACRE-FEET
SIZE CLASSIFICATION IS "SMALL"

HAZARD CLASSIFICATION
SEVERAL HOMES ARE LOCATED ALONG THE DOWNSTREAM CHANNEL.
USE "HIGH"

RECOMMENDED SPILLWAY DESIGN FLOOD
THE ABOVE CLASSIFICATIONS INDICATE USE OF AN SDF EQUAL TO ONE-HALF THE PROBABLE MAXIMUM FLOOD TO THE FULL PMF.

BY RLS DATE 7/2/91 | BERGER ASSOCIATES | SHEET NO. 5 OF 7

CHKD. BY ____ DATE ____ | PROJECT D0590

SUBJECT STOUFFER LAKE DAM

EMBANKMENT RATING

$Q = CLH^{3/2}$ $C = 2.7$ (KING'S HDBK)

AT ELEV 568.5

$2.7 \times 38 \times (.2)^{1.5} = 9$

$2.7 \times 100 \times (.5)^{1.5} = 95$

$2.7 \times 135 \times (.55)^{1.5} = 149$

$2.7 \times 2 \times (.2)^{1.5} = -$ $\Sigma = 253$ CFS

AT ELEV 569

$2.7 \times 11 \times (.15)^{1.5} = 2$

$2.7 \times 50 \times (.6)^{1.5} = 63$

$2.7 \times 100 \times (1)^{1.5} = 270$

$2.7 \times 135 \times (1.05)^{1.5} = 392$

$2.7 \times 4 \times (.45)^{1.5} = 3$ $\Sigma = 730$ CFS

AT ELEV 570

$2.7 \times 46 \times (.65)^{1.5} = 65$

$2.7 \times 50 \times (1.6)^{1.5} = 273$

$2.7 \times 100 \times (2)^{1.5} = 764$

$2.7 \times 135 \times (2.05)^{1.5} = 1070$

$2.7 \times 9 \times (.95)^{1.5} = 23$ $\Sigma = 2195$ CFS

AT ELEV 571

$2.7 \times 17 \times (.45)^{1.5} = 14$

$2.7 \times 50 \times (1.6)^{1.5} = 273$

$2.7 \times 50 \times (2.6)^{1.5} = 566$

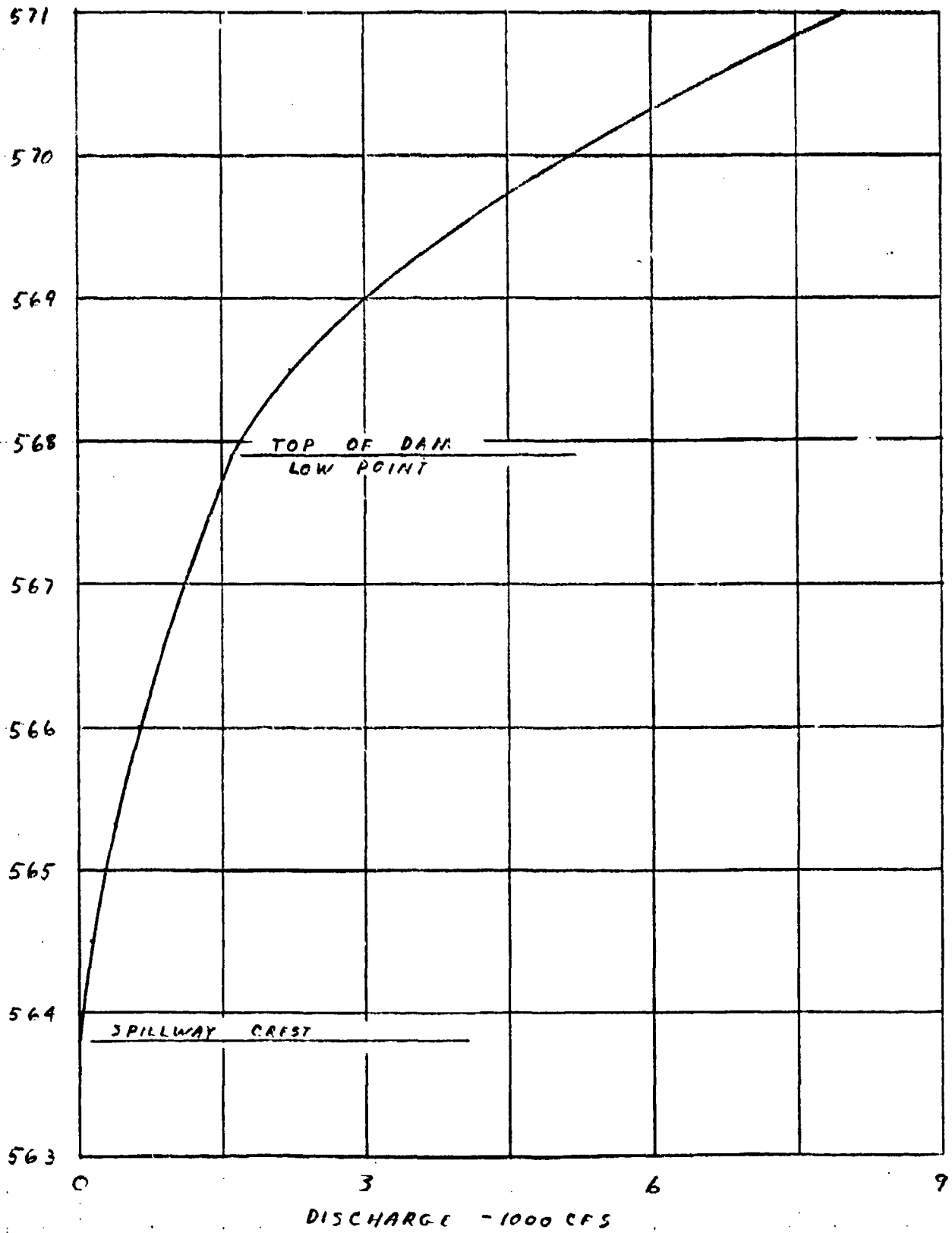
$2.7 \times 100 \times (3)^{1.5} = 1403$

$2.7 \times 135 \times (3.05)^{1.5} = 1942$

$2.7 \times 13 \times (1.45)^{1.5} = 61$ $\Sigma = 4259$ CFS

BY RLS DATE 7/22/81 **BERGER ASSOCIATES** SHEET NO. 5A OF 7
CHKD. BY DATE PROJECT D0590
SUBJECT STOUFFER LAKE DAM

TOTAL DISCHARGE CURVE

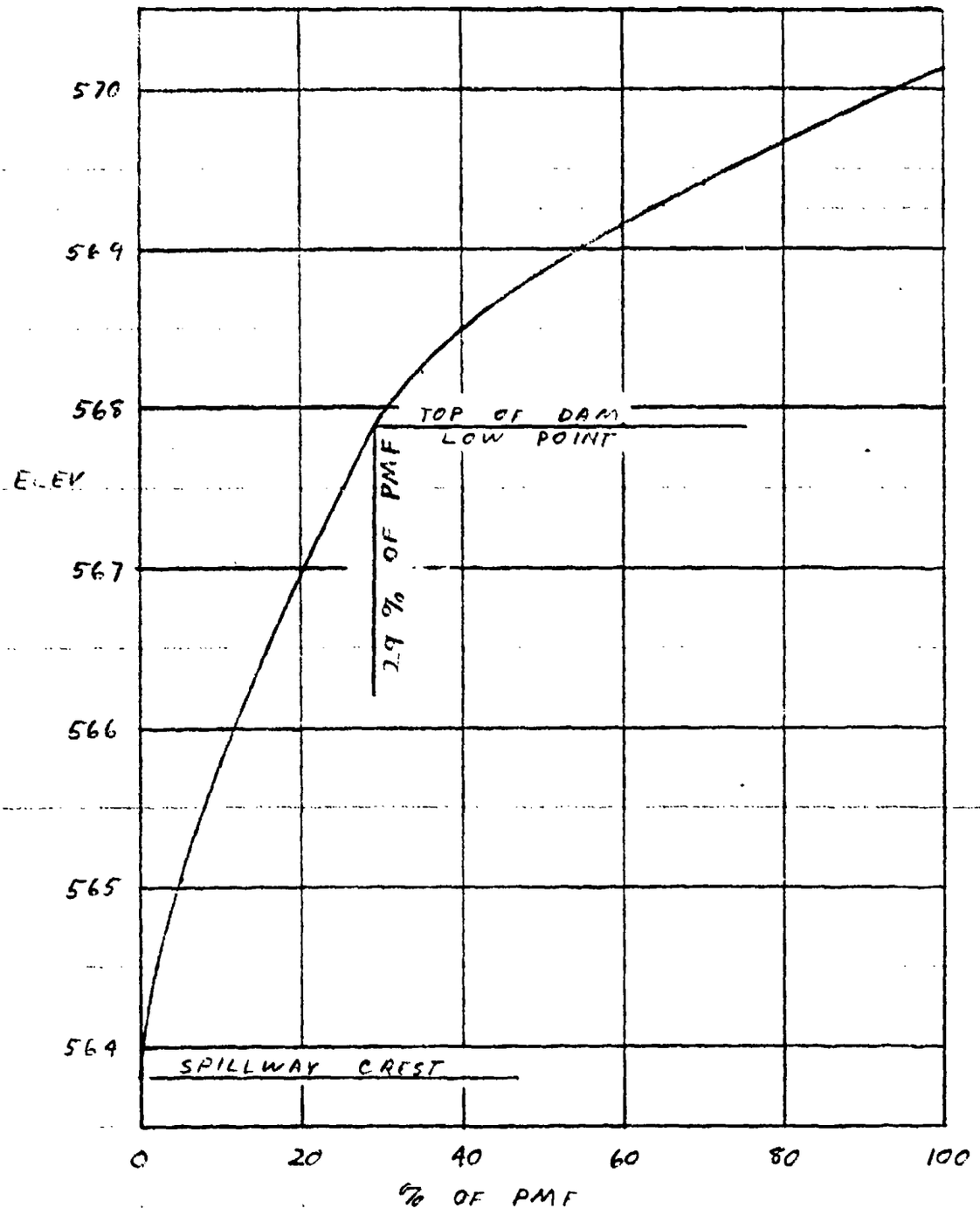


BY RLS DATE 7/2/81 **BERGER ASSOCIATES** SHEET NO. 6 OF 7

CHKD. BY DATE PROJECT D0590

SUBJECT STOUFFER LAKE DAM

SPILLWAY CAPACITY CURVE



BY RLS DATE 7/2/51 **BERGER ASSOCIATES** SHEET NO. 7 OF 7

CHKD. BY DATE PROJECT D0596

SUBJECT STOUFFER LAKE DAM

BREACH ASSUMPTIONS

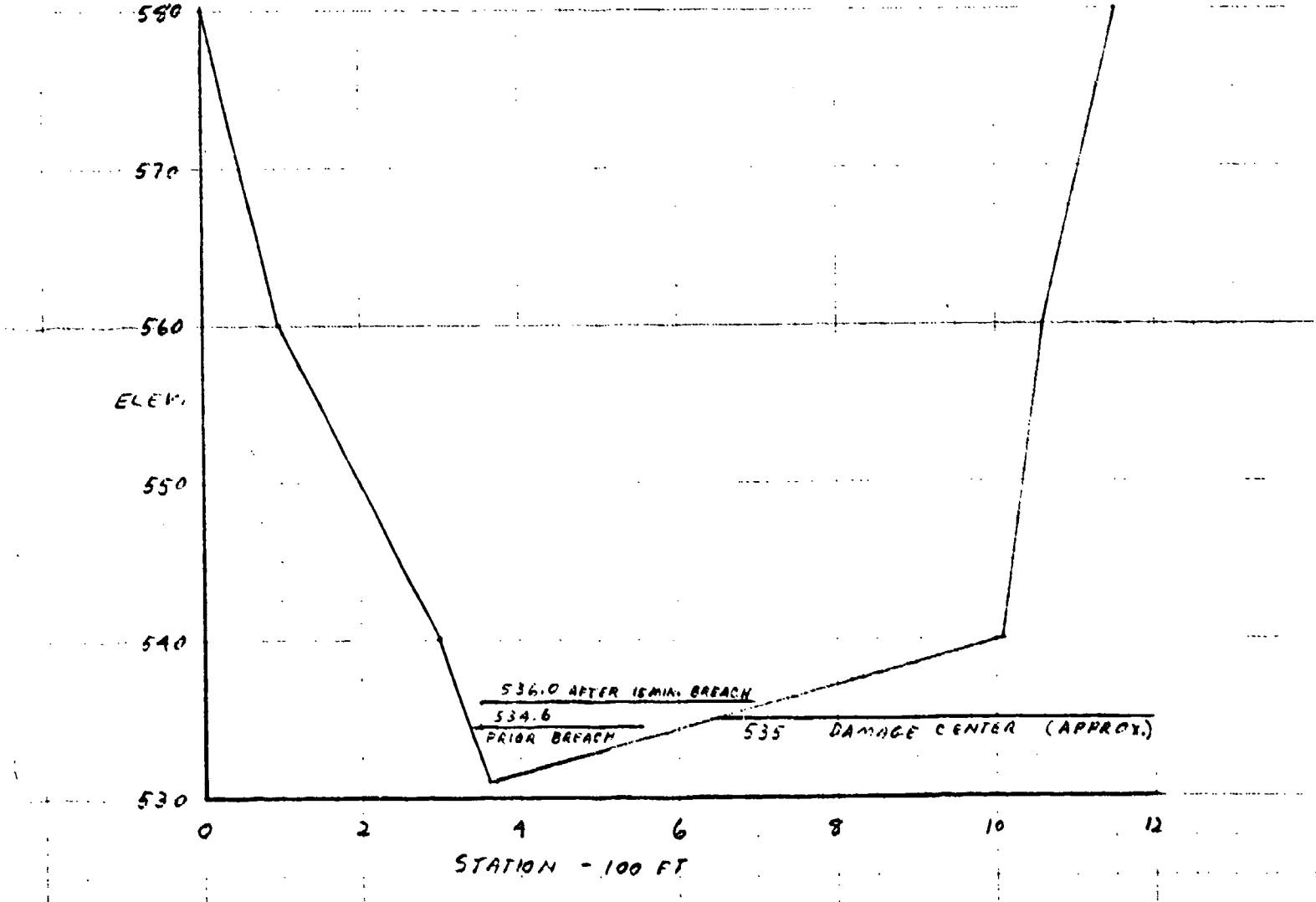
BREACH WIDTH = 50'

SIDE SLOPES (EARTH EMBANKMENT) = 1:1

FAILURE TIME (EARTH EMBANKMENT) =
BETWEEN 15 MIN. AND 2 HR.
USE: .25 HR., .5 HR., 1 HR., 2 HR.

POOL LEVEL AT FAILURE: EARTH EMBANKMENT
SAY 0.5 FT OVER TOP OF DAM

SECTION AT DAMAGE CENTER



HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: Stouffer Lake Dam RIVER BASIN: Susquehanna

PROBABLE MAXIMUM PRECIPITATION (PMP) = 23.2 INCHES/24 HOURS[1]

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		STOUFFER LAKE DAM			
DRAINAGE AREA (SQUARE MILES)		1.79			
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		1.79			
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%)[2]	6 HOURS	113			
	12 HOURS	123			
	24 HOURS	132			
	48 HOURS	142			
	72 HOURS Zone 6				
SNYDER HYDROGRAPH PARAMETERS	ZONE[3]	15B			
	C_p / C_t[4]	0.85/2.20			
	L (MILES)[5]	1.97			
	L_{ca} (MILES)[5]	.45			
	$T_p = C_t (L \cdot L_{ca})^{0.3}$ (Hours)	2.12			
SPILLWAY DATA	CREST LENGTH (FT.)	50			
	FREEBOARD (FT)	4.1			
	DISCHARGE COEFFICIENT	3.88			
	EXPONENT	1.5			
	ELEVATION	563.8			
AREA[6] (ACRES)	NORMAL POOL (563.8)	6.1			
	ELEV. 580	23.0			
	ELEV.				
STORAGE (ACRE-FEET)	NORMAL POOL[7] (563.8)	26.1			
	ELEV. 551.0 [8]	0			
	ELEV. [8]				
	ELEV. [8]				

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.

L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

(6) Planimetered area encompased by contour upstream of dam.

(7) PennDER files.

(8) Computed by conic method.

TABLE NO. 1

COMPARISON OF WATER SURFACE ELEVATIONS

STOUFFER LAKE DAM

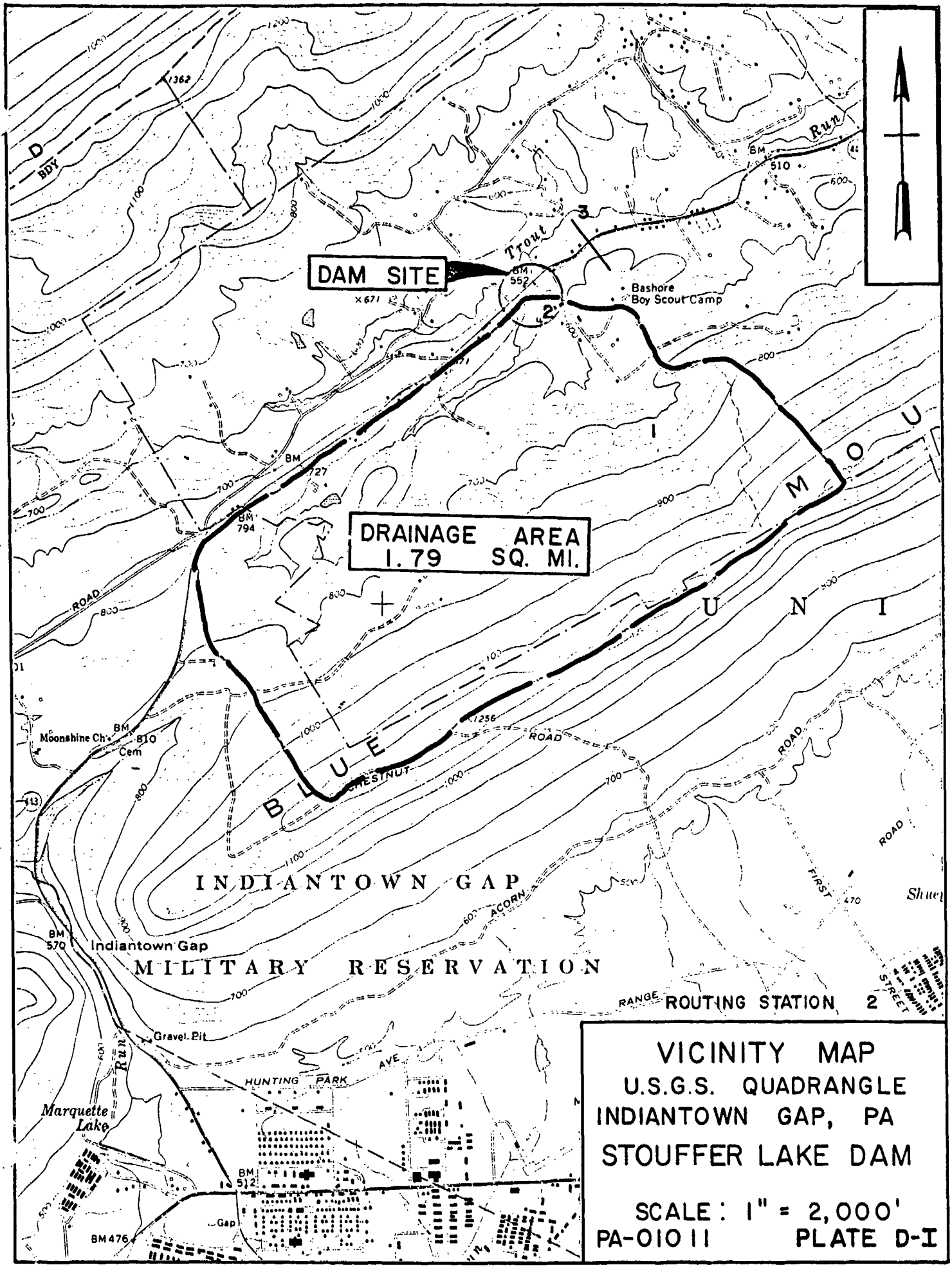
PMF = 5562 cfs SDF = 2781 cfs

Crest Elevation (Low Point) - 567 9 Spillway Elevation - 563.8

	STAGE	CREST OF DAM ELEVATION	CREST OF DAM DEPTH	1800' D/S OF DAM* ELEVATION
A.	At Low Point in Embankment Crest	567.9	0	534.2
B.	39% PMF Overtopping No Breach	568.44	.54	534.6
C.	39% PMF Overtopping (.25 Hour Breach)	563.42	.52	536.0
D.	39% PMF Overtopping (2 Hour Breach)	568.43	.53	534.7

*Several homes located about 1800 feet downstream of Stouffer Lake Dam. Considered to be damage center.

Condition C: (Time refers to elapsed time after start of storm). Time to reach breach elevation 568.4 at dam = 41.5 Hours. Water level 1800' downstream prior to breach = 534.6. Duration of breach = .25 Hours. Time for breach to peak 1800' downstream = .25 Hours. Peak elevation 1800' downstream due to breach = 536.0.



VICINITY MAP

U.S.G.S. QUADRANGLE
INDIANTOWN GAP, PA

STOUFFER LAKE DAM

SCALE: 1" = 2,000'

PA-01011 PLATE D-I

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  01 APR 80
**********
    1            A1     STOUFFER LAKE DAM    ****    TRIB. TO TROUT RUN
    2            A2     UNION TWP., LEBANON COUNTY, PA.
    3            A3     NDI # PA-01011      PA DER # 38-82
    4            B   300      0     15      0      0      0      0      0     -4      0
    5            B1    5
    6            J     1      9      1
    7            J1    1    .85    .65     .5    .35    .25     .2     .1    .05
    8            K            1                                   1
    9            K1             INFLOW  HYDROGRAPH
   10            M     1      1   1.79
   11            P           23.2    113    123    132    142
   12            T                                           1    .05
   13            W  2.12    .85
   14            X  -1.5   -.05      2
   15            K     1      2                                   1
   16            K1               RESERVOIR  ROUTING
   17            Y                             1
   18            Y1    1                                    26.1     -1
   19            Y4 563.8  564.5    565    566    567  567.9  568.5    569    570    571
   20            Y5    0    114    255    633   1111   1611   2230   3030   5190   8007
   21            $A    0    6.1     23
   22            $E  551  563.8    580
   23            $$ 563.8
   24            $D 567.9
   25            K    99
1                          PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                RUNOFF HYDROGRAPH AT          1
                                ROUTE HYDROGRAPH TO           2
                                END OF NETWORK


1**********
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION     JULY 1978
   LAST MODIFICATION  01 APR 80
 **********

 RUN  DATE* 81/07/02.
      TIME* 08.20.50.


                     STOUFFER LAKE DAM    ****    TRIB. TO TROUT RUN
                     UNION TWP., LEBANON COUNTY, PA.
                     NDI # PA-01011      PA DER # 38-82

                                  JOB SPECIFICATION
          NQ     NHR    NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
         300       0      15       0       0       0       0       0      -4       0
                           JOPER     NWT   LROPT   TRACE
                               5       0       0       0


                          MULTI-PLAN ANALYSES TO BE PERFORMED
                              NPLAN= 1 NRTIO= 9 LRTIO= 1
          RTIOS=   1.00    .85    .65    .50    .35     25    .20    .10    .05
```

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.79	0.00	1.79	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.20	113.00	123.00	132.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 2.12 CP= .85 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES, LAG= 2.10 HOURS, CP= .81 VOL= 1.00

28.	96.	172.	243.	305.	361.	410.	444.	451.	437.
408.	367.	315.	239.	150.	85.	48.	27.	15.	

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	26.36	23.96	2.40	111833.
										(669.)	(608.)	(61.)	(3166.76)

********** ********** ********** ********** **********

3/11

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

RESERVOIR ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	26.	-1

STAGE	563.80	564.50	565.00	566.00	567.00	567.90	568.50	569.00	570.00	571.00
FLOW	0.00	114.00	255.00	633.00	1111.00	1611.00	2230.00	3030.00	5190.00	8007.00
SURFACE AREA=	0.	6.	23.							
CAPACITY=	0.	26.	247.							
ELEVATION=	551.	564.	580.							

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
563.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
567.9	0.0	0.0	0.

PEAK OUTFLOW IS 5570. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 4735. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 3621. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 2785. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 1947. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 1382. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 1103. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 550. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 275. AT TIME 42.00 HOURS

********** ********** ********** ********** **********

********** ********** ********** ********** **********

1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 .85	RATIO 3 .65	RATIO 4 .50	RATIO 5 .35	RATIO 6 .25	RATIO 7 .20	RATIO 8 .10	RATIO 9 .05
HYDROGRAPH AT	1	1.79	1	5562.	4728.	3615.	2761.	1947.	1391.	1112.	556.	278.
	(	4.64)	(	157.50)(	133.87)(	102.37)(	78.75)(	55.12)(	39.37)(	31.50)(	15.75)(	7.87)
ROUTED TO	2	1.79	1	5570.	4735.	3621.	2785.	1947.	1382.	1103.	550.	275.
	(	4.64)	(	157.73)(	134.08)(	102.53)(	78.85)(	55.13)(	39.14)(	31.24)(	15.58)(	7.79)

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	563.81	563.80	567.90
STORAGE	26.	26.	57.
OUTFLOW	1.	0.	1611.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	570.13	2.23	81.	5570.	5.50	41.75	0.00
.85	569.79	1.89	77.	4735.	5.25	41.75	0.00
.65	569.27	1.37	71.	3621.	4.25	41.75	0.00
.50	568.85	.95	67.	2785.	3.25	41.75	0.00
.35	568.23	.33	61.	1947.	2.00	41.75	0.00
.25	567.49	0.00	54.	1382.	0.00	41.75	0.00
.20	566.98	0.00	49.	1103.	0.00	41.75	0.00
.10	565.78	0.00	40.	550.	0.00	42.00	0.00
.05	565.05	0.00	34.	275.	0.00	42.00	0.00

EOI ENCOUNTERED.
N>

5/11

```
 LAST MODIFICATION  01 APR 80
*****************************
   1              A1    STOUFFER LAKE DAM    ****    TRIB. TO TROUT RUN
   2              A2    UNION TWP., LEBANON COUNTY, PA.
   3              A3    NDI # PA-01011      PA DER # 38-32
   4              B   300     0     15      0     0      0      0      0     -4     0
   5              B1    5
   6              J     5     1      1
   7              J1  .39
   8              K           1                                    1
   9              K1            INFLOW  HYDROGRAPH                                  *
  10              M     1     1   1.79                                          1    *
  11              P          23.2   113    123    132    142
  12              T                                                1   .05
  13              W  2.12   .85
  14              X  -1.5  -.05     2
  15              K     1     2                                    1
  16              K1            RESERVOIR  ROUTING
  17              Y                                 1      1
  18              Y1    1                                                26.1    -1
  19              Y4 563.8  564.5   565    566    567   567.9  568.5   569    570    571
  20              Y5    0   114     235    633   1111   1611   2230  3030   5190   8007
  21              $A    0   6.1      23
  22              $E   551  563.8   580
  23              $$ 563.8
  24              $D 567.9
  25              $B   50     1     555   .25   563.8    700
  26              $B   50     1     555   .25   563.8   568.4
  27              $B   50     1     555    .5   563.8   568.4
  28              $B   50     1     555     1   563.8   568.4
  29              $B   50     1     555     2   563.8   568.4
  30              K     1     3                                    1
  31              K1              ROUTING THRU REACH 2 - 3
  32              Y                                 1      1
  33              Y1    1
  34              Y6   .1    .06     .1    531    580    1800  .0068
  35              Y7    0   580     100    560    300     540   360   531    370    531
  36              Y7 1010   540    1060    560   1150     580
  37              K    99
1                       PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                             RUNOFF HYDROGRAPH AT          1
                             ROUTE HYDROGRAPH TO           2
                             ROUTE HYDROGRAPH TO           3
                             END OF NETWORK


1*******************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION     JULY 1978
   LAST MODIFICATION  01 APR 80
 *******************************

 RUN  DATE* 81/07/02.
      TIME* 10.44.35.
```

STOUFFER LAKE DAM **** TRIB. TO TROUT RUN
UNION TWP., LEBANON COUNTY, PA.
NDI # PA-01011 PA DER # 38-82

6/11

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	MSTAN
300	0	15	0	0	0	0	0	-4	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 5 NRTIO= 1 LRTIO= 1

RTIOS= .39

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.79	0.00	1.79	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.20	113.00	123.00	132.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 2.12 CP= .65 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES, LAG= 2.10 HOURS, CP= .81 VOL= 1.00

28.	96.	172.	243.	305.	361.	410.	444.	451.	437.
408.	367.	315.	239.	150.	85.	48.	27.	15.	

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	26.36	23.96	2.40	111833.
										(669.)	(608.)	(61.)	(3166.76)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

7/11

RESERVOIR ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	26.	-1

STAGE	563.80	564.50	565.00	566.00	567.00	567.90	568.50	569.00	570.00	571.00
FLOW	0.00	114.00	255.00	633.00	1111.00	1611.00	2230.00	3030.00	5190.00	8007.00
SURFACE AREA=	0.	6.	23.							
CAPACITY=	0.	26.	247.							
ELEVATION=	551.	564.	580.							

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
563.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
567.9	0.0	0.0	0.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
50.	1.00	555.00	.25	563.80	700.00

PEAK OUTFLOW IS 2169. AT TIME 41.75 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
50.	1.00	555.00	.25	563.80	568.40

BEGIN DAM FAILURE AT 41.50 HOURS

PEAK OUTFLOW IS 5793. AT TIME 41.75 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
50.	1.00	555.00	.50	563.80	568.40

BEGIN DAM FAILURE AT 41.50 HOURS

PEAK OUTFLOW IS 4232. AT TIME 42.00 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
50.	1.00	555.00	1.00	563.80	568.40

BEGIN DAM FAILURE AT 41.50 HOURS

PEAK OUTFLOW IS 3066. AT TIME 42.42 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
50.	1.00	555.00	2.00	563.80	569.40

8/11

BEGIN DAM FAILURE AT 41.50 HOURS

PEAK OUTFLOW IS 2326. AT TIME 42.42 HOURS

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTING THRU REACH 2 - 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.1000	.0600	.1000	531.0	580.0	1800.	.00680

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 580.00 100.00 560.00 300.00 540.00 360.00 531.00 370.00 531.00
1010.00 540.00 1060.00 560.00 1150.00 580.00

STORAGE	0.00	11.75	44.68	99.39	172.94	262.07	334.64	420.64	510.08	602.96
	699.27	799.02	901.96	1007.54	1115.74	1226.54	1339.96	1455.98	1574.62	1695.87
OUTFLOW	0.00	711.26	4247.61	12261.03	27835.36	51195.21	80190.17	114506.67	153938.27	198342.18
	247616.98	301689.82	360746.64	424560.15	492980.19	565952.47	643436.05	725399.91	811820.71	902681.30
STAGE	531.00	533.58	536.16	538.74	541.32	543.89	546.47	549.05	551.63	554.21
	556.79	559.37	561.95	564.53	567.11	569.68	572.26	574.84	577.42	580.00
FLOW	0.00	711.26	4247.61	12261.03	27835.36	51195.21	80190.17	114506.67	153938.27	198342.18
	247616.98	301689.82	360746.64	424560.15	492980.19	565952.47	643436.05	725399.91	811820.71	902681.30

MAXIMUM STAGE IS 534.6

MAXIMUM STAGE IS 536.0

MAXIMUM STAGE IS 535.7

MAXIMUM STAGE IS 535.2

MAXIMUM STAGE IS 534.7

1

9/11

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .39
HYDROGRAPH AT	1	1.79	1	2169.
		(4.64)		(61.42)(
			2	2169.
				(61.42)(
			3	2169.
				(61.42)(
			4	2169.
				(61.42)(
			5	2169.
				(61.42)(
ROUTED TO	2	1.79	1	2169.
		(4.64)		(61.43)(
			2	5793.
				(164.04)(
			3	4232.
				(119.85)(
			4	2982.
				(84.45)(
			5	2312.
				(65.47)(
ROUTED TO	3	1.79	1	2158.
		(4.64)		(61.10)(
			2	4058.
				(114.91)(
			3	3677.
				(104.13)(
			4	2980.
				(84.38)(
			5	2300.
				(65.13)(

1

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	563.80	563.80	567.90
STORAGE	26.	26.	57.
OUTFLOW	0.	0.	1611.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.39	568.44	.54	63.	2169.	2.25	41.75	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	563.80	563.80	567.90
STORAGE	26.	26.	57.
OUTFLOW	0.	0.	1611.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.39	568.42	.52	62.	5793.	1.14	41.75	41.50

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	563.80	563.80	567.90
STORAGE	26.	26.	57.
OUTFLOW	0.	0.	1611.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.39	568.42	.52	62.	4232.	1.23	42.00	41.50

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	563.80	563.80	567.90
STORAGE	26.	26.	57.
OUTFLOW	0.	0.	1611.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.39	568.42	.52	62.	3066.	1.40	42.42	41.50

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	563.80	563.80	567.90
STORAGE	26.	26.	57.
OUTFLOW	0.	0.	1611.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.39	568.43	.53	63.	2326.	1.71	42.42	41.50

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.39	2158.	534.6	41.75

PLAN 2 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.39	4058.	536.0	41.75

PLAN 3 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.39	3677.	535.7	42.00

PLAN 4 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.39	2980.	535.2	42.50

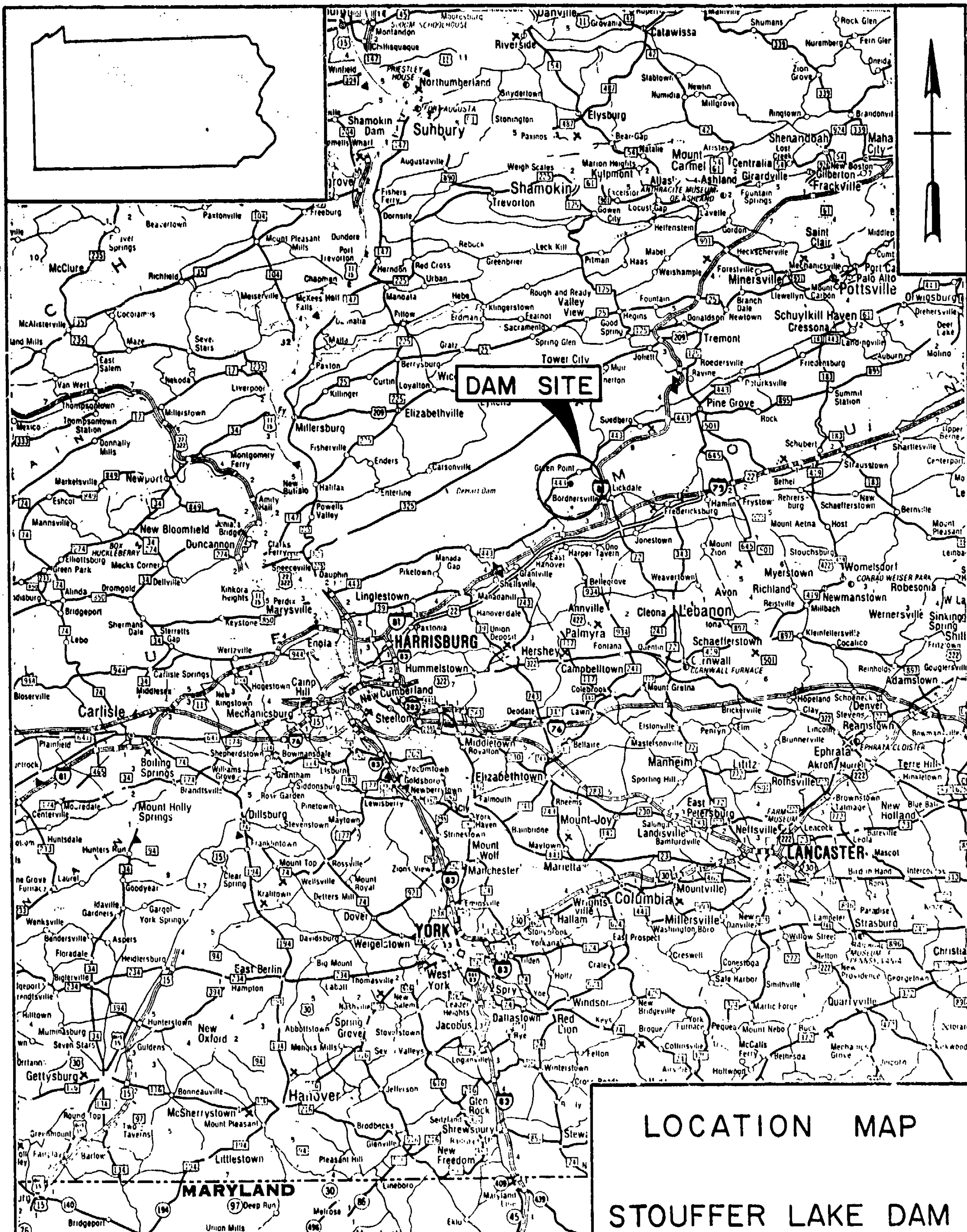
PLAN 5 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.39	2300.	534.7	42.50

EOI.
E>

APPENDIX E

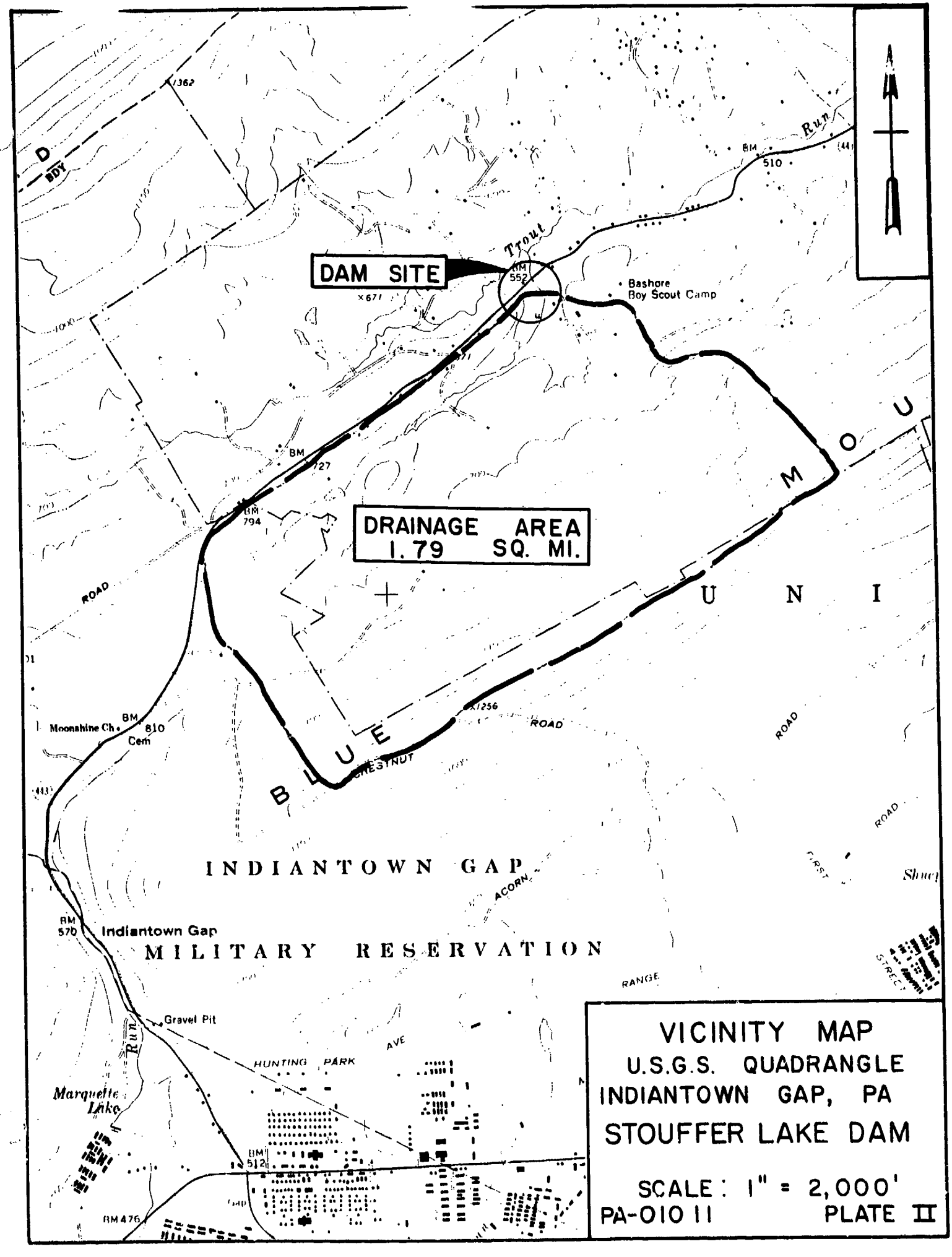
PLATES



LOCATION MAP

STOUFFER LAKE DAM

PA-01011 PLATE I



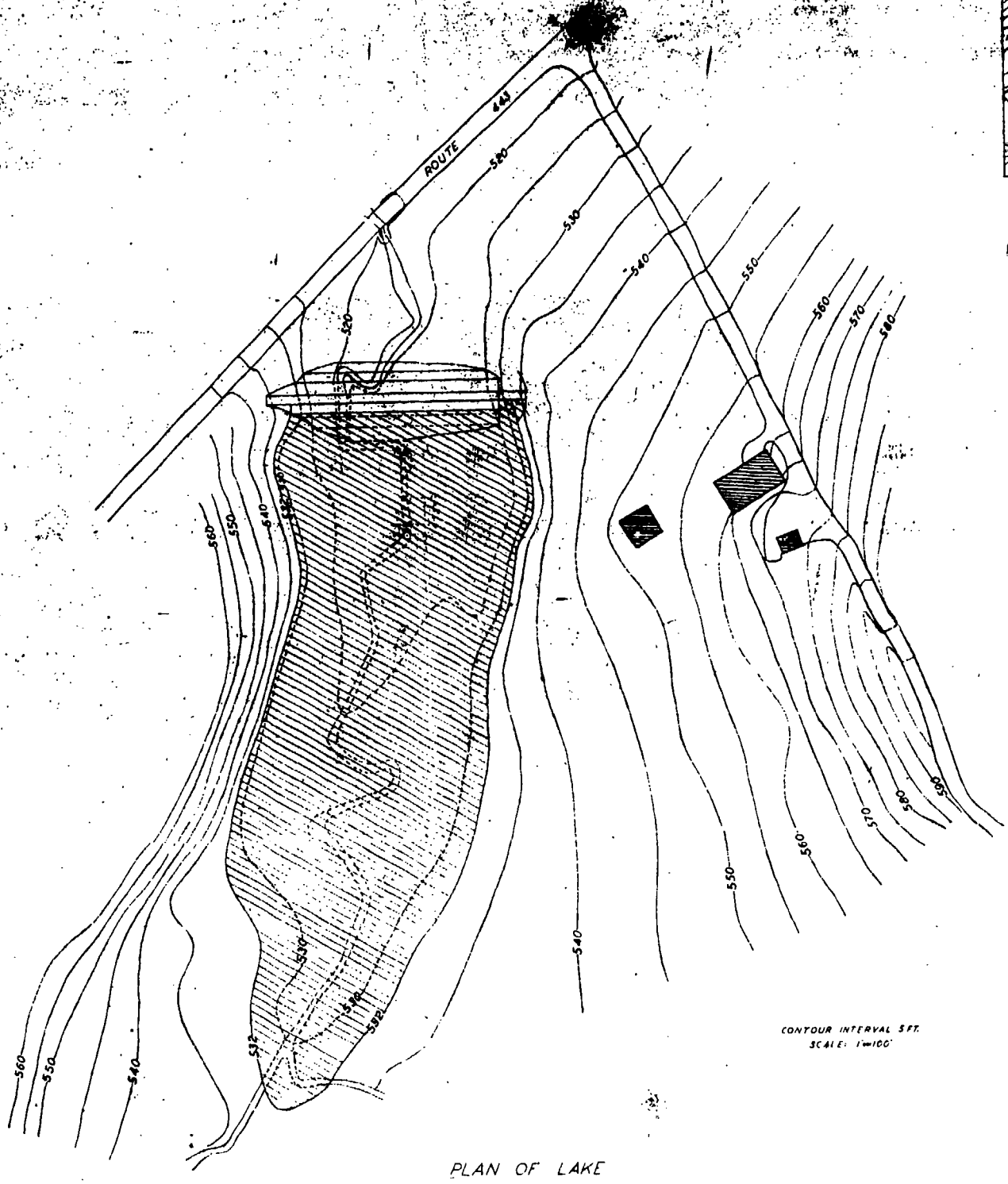
VICINITY MAP

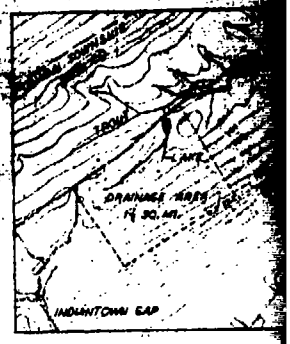
U.S.G.S. QUADRANGLE
INDIANTOWN GAP, PA

STOUFFER LAKE DAM

SCALE: 1" = 2,000'

PA-01011 PLATE II





LOCATION M
SCALE: 1/62500

PLAN OF LAKE

WATER AREA AT FLOW LINE (EL. 5320) — 5.47 ACRES
WATER AREA AT FLOOD STAGE (EL. 5360) — 8.21 ACRES

LOCATION MAP
SCALE: 1/62500

BM EL 1000 MONUMENT VITR

BRIDGE
EL SPAN
EL CL

ROUTE

CENTER

42 DIVERSION PIPE

24" OUTLET VALVE

STA. 4+25

CENTER LINE DAM

PLAN OF DAM

1-2

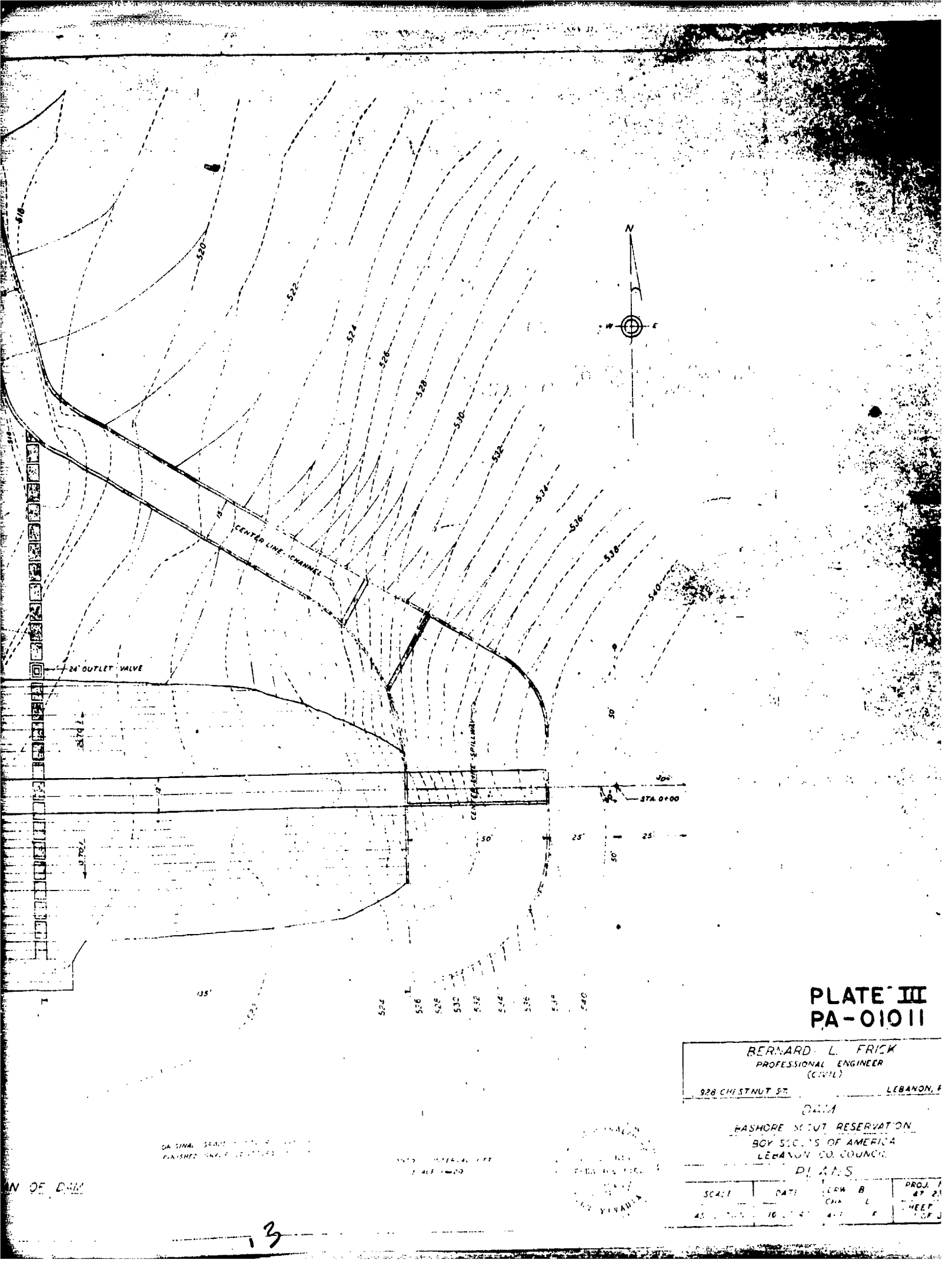


PLATE III
PA-01011

BERNARD L. FRICK
PROFESSIONAL ENGINEER
(CIVIL)
928 CHESTNUT ST. LEBANON, P

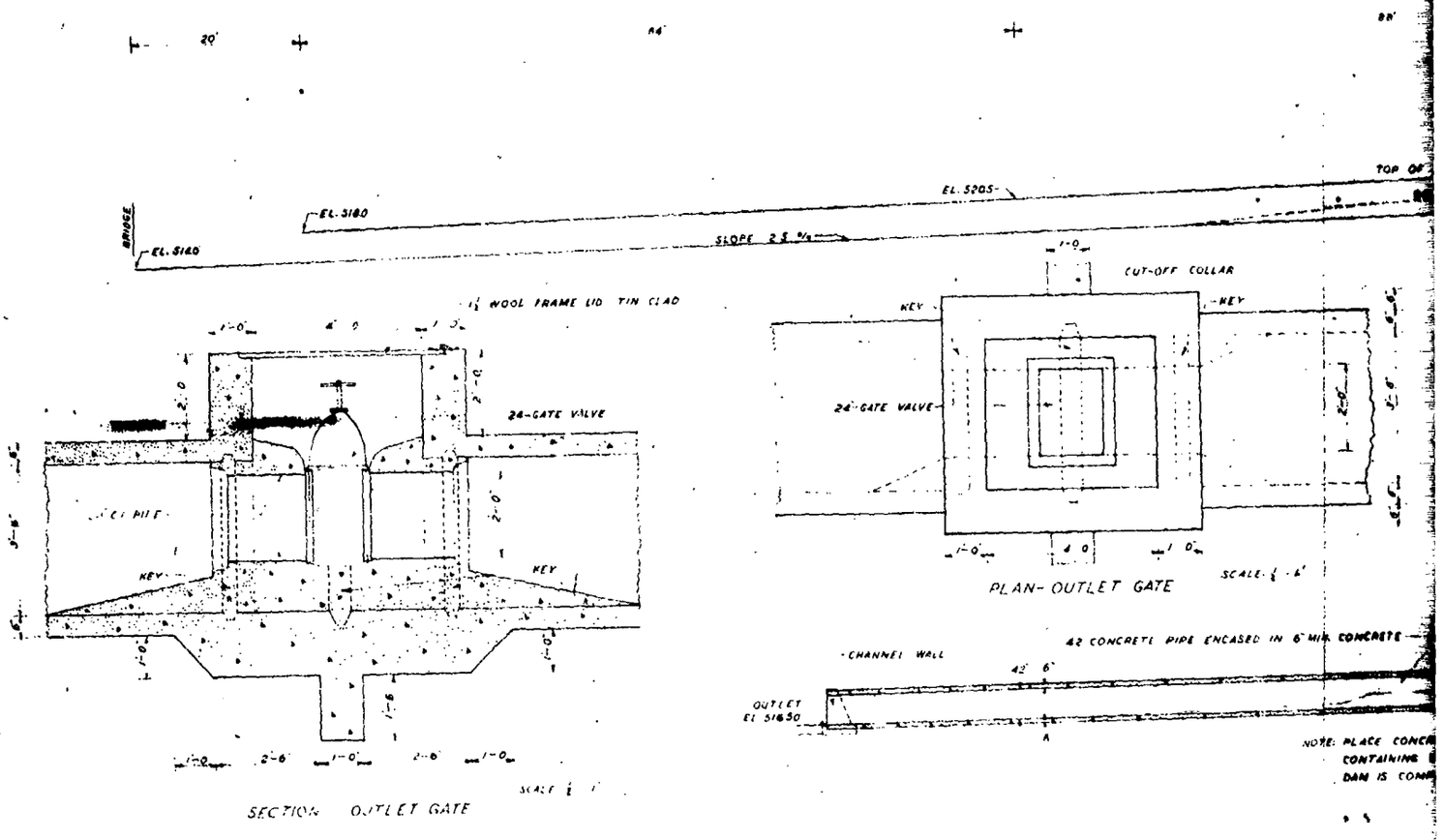
DAM
EASHORE SCOUT RESERVATION
BOY SCOUTS OF AMERICA
LEBANON CO. COUNCIL

PLANS

SCALE	DATE	DRN B CHK L	PROJ.
AS	10		SHEET OF

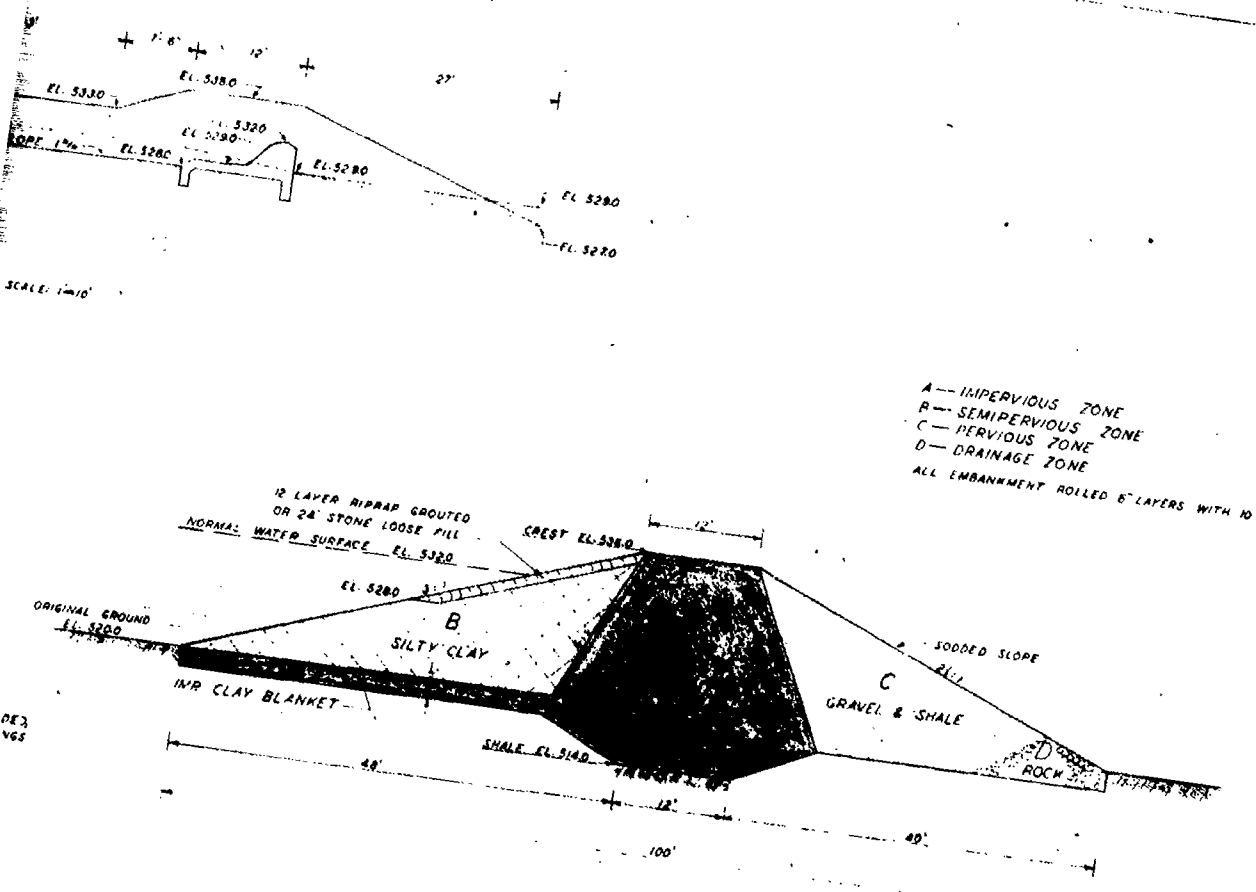
N OF DAM

13


20'
A4'
B8'
TOP OF
EL. 5205
EL. 5180
BRIDGE
EL. 5140
SLOPE 2.5 %
1½ WOOL FRAME LID TIN CLAD
24-GATE VALVE
KEY
KEY
CUT-OFF COLLAR
KEY
KEY
24-GATE VALVE
SCALE: ½" = 1'
PLAN- OUTLET GATE
42 CONCRETE PIPE ENCASED IN 6" MIN. CONCRETE
CHANNEL WALL
OUTLET
EL 516.50
NOTE: PLACE CONCR
CONTAINING
DAM IS CONS
SECTION OUTLET GATE


STA 3+95
550
540
530
520
510
500
A
A
EL 532.10
EL 520.10
EL 517.50

EL. 5330
EL. 5300
EL. 5320
EL. 5360
EL. 5290
EL. 5280
EL. 5278.6
EL. 5227.5
EL. 5189
TOP OF WEST CHANNEL WALL
ORIGINAL GROUND
FLOW LINE
SLOPE 2.5 %
SLOPE 1%
PROFILE OF SPILLWAY CHANNEL
SCALE: 1"=10'
CUT-OFF COLLAR
1:2:4 CONCRETE
3'-6" CONC. PIPE
3-5/8" ø LONGITUDINAL
10'-0"
SECTION B-B · PIPE OUTLET
SCALE: 1"=1'
NORMAL WAT
35'-0"
12'-0"
40'-6"
10'-6"
ORIGINAL GROUND
EL. 520.0
IMP. CLAY
CONCRETE
METAL TRASH RACK, 1'0 PIPE, WELDED, 8" SQ OPENINGS
INVERT EL 5190
ORIGINAL GROUND
SLOPE 1.42 %
B
B'
30'
30'
CUT-OFF COLLARS PROJECT 2' ALL DIRECTIONS
NOTE: PLACE CONCRETE PLUG CONTAINING VALVE AFTER DAM IS COMPLETED
PROFILE OF PIPE OUTLET
SCALE 1"=10'
EARTH DAM BREAST 3220'
A
CREST OF DAM EL 536.0
NORMAL WATER SURFACE EL. 532.0
EL. 519.90
EL. 520.80
EL. 521.40
EL. 521.60
SHALE EL. 513.90
SHALE EL. 514.60
SHALE EL. 514.10
CLAY & STONE EL. 517.40
EL. 514.0
A
CLAY CORE FOUNDATION
EXCAVATE TO ELEV SHOWN OR TO IMPERVIOUS FOUNDATION
2300'
SCALE 1"=10'
SECTION ℄ DAM



SECTION A–A

TYPICAL SECTION THRU DAM

SCALE 1"=10'

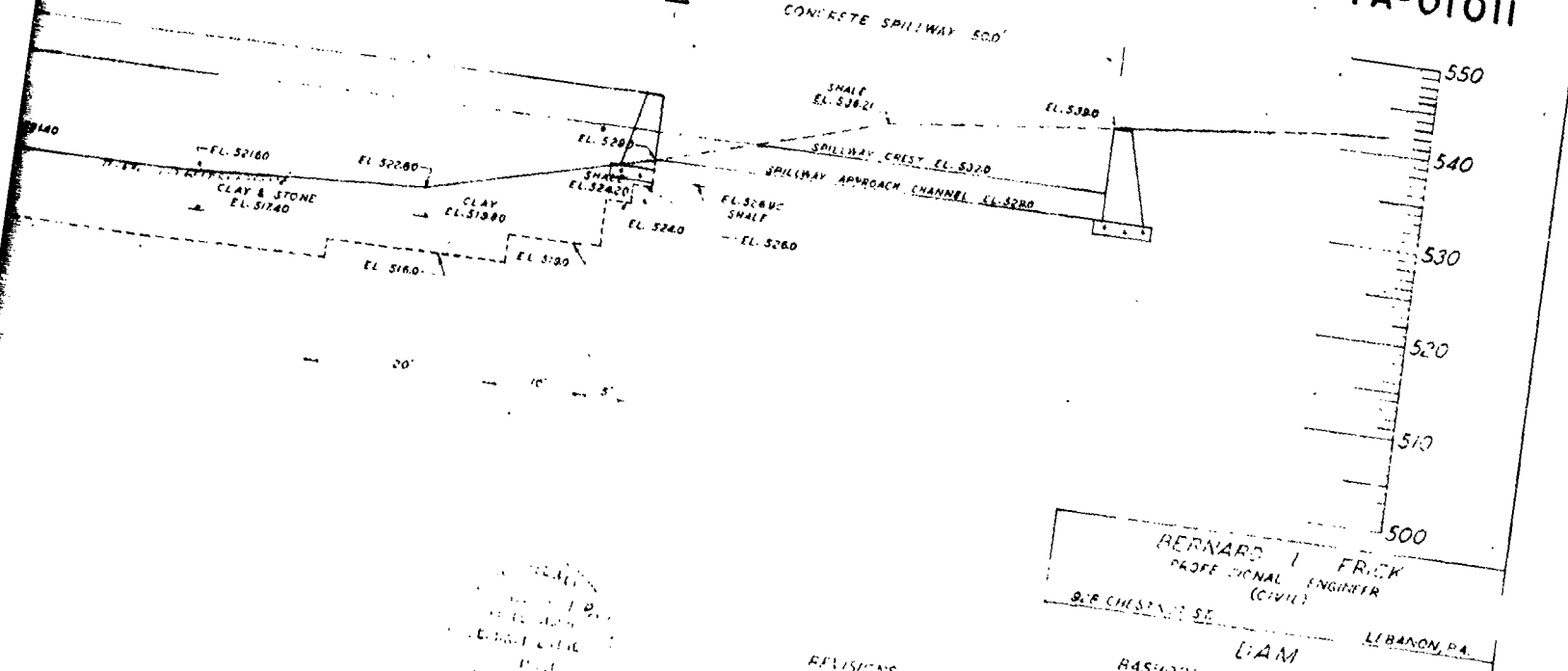


PLATE IV
PA-01011

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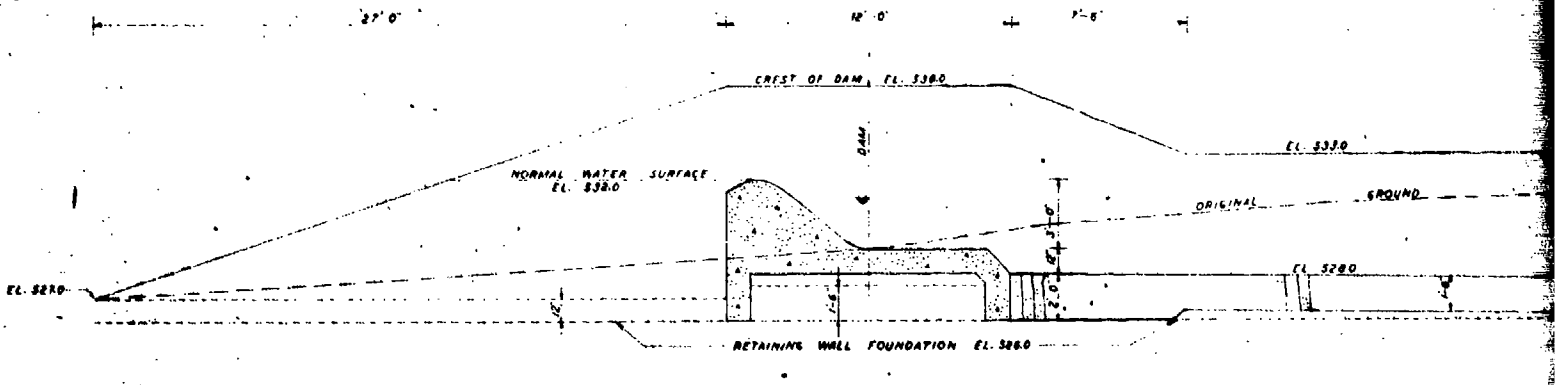
LEBANON, PA.

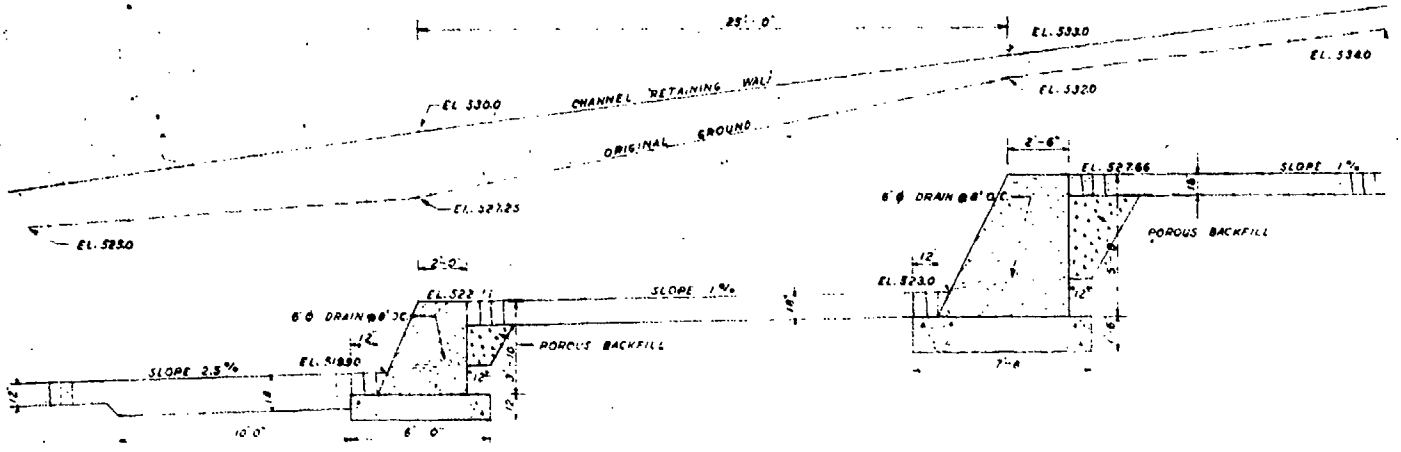
REVISIONS

LAM
BASHORE SCOUT RESERVATION
BOY SCOUTS OF AMERICA
LEBANON COUNCIL
DETAIL PLAN SECTIONS
DRAWN
SHEET NO
2 OF 3

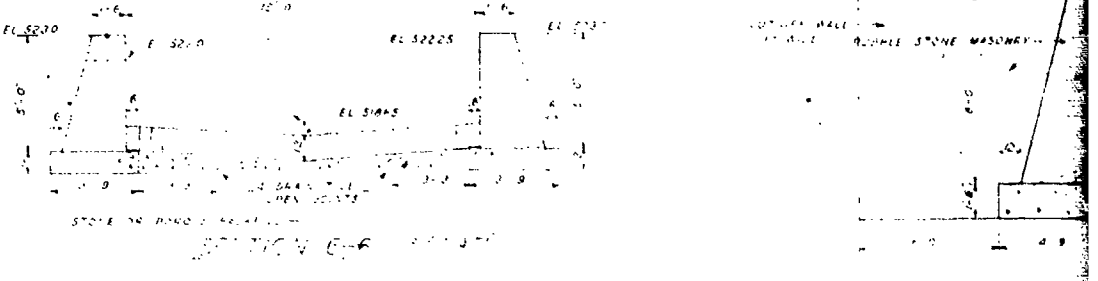
13



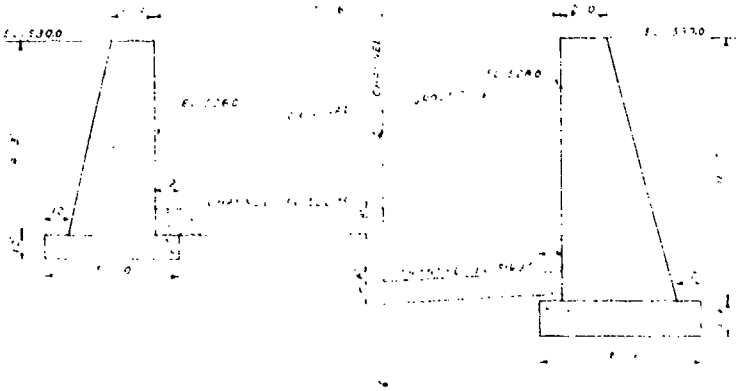
SECTION 8-8 SCALE: 1"=1'



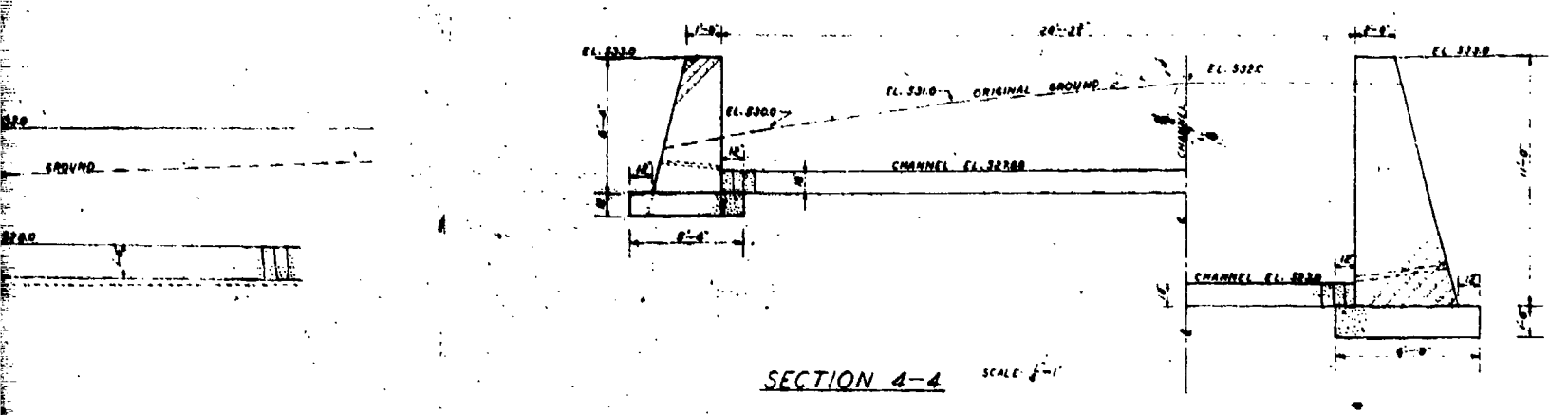
SECTION 7-7 SCALE: 1"=1'



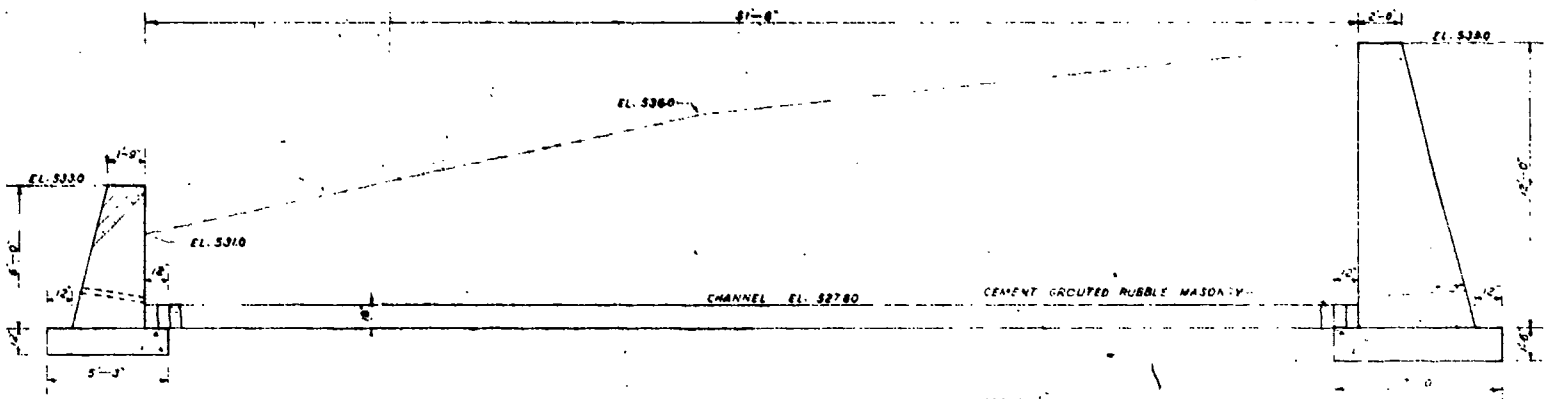
SECTION 6-6



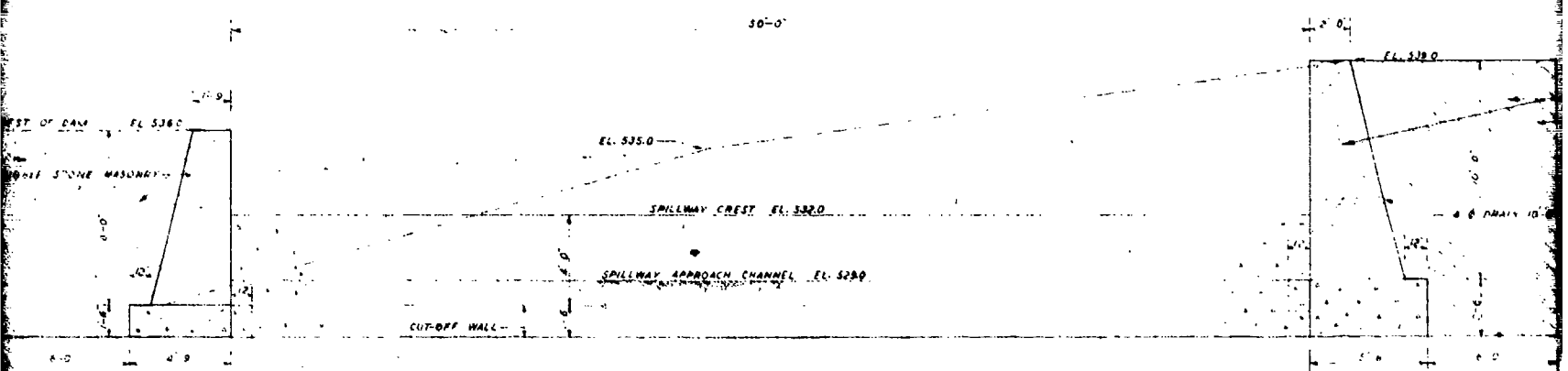
SECTION 5-5



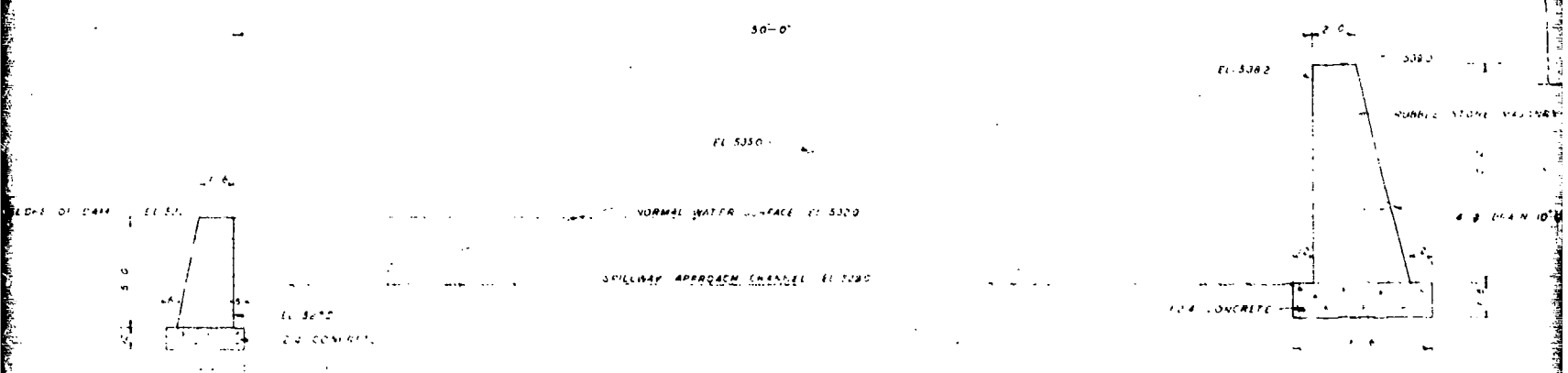
SECTION 4-4 SCALE 1/4"=1'



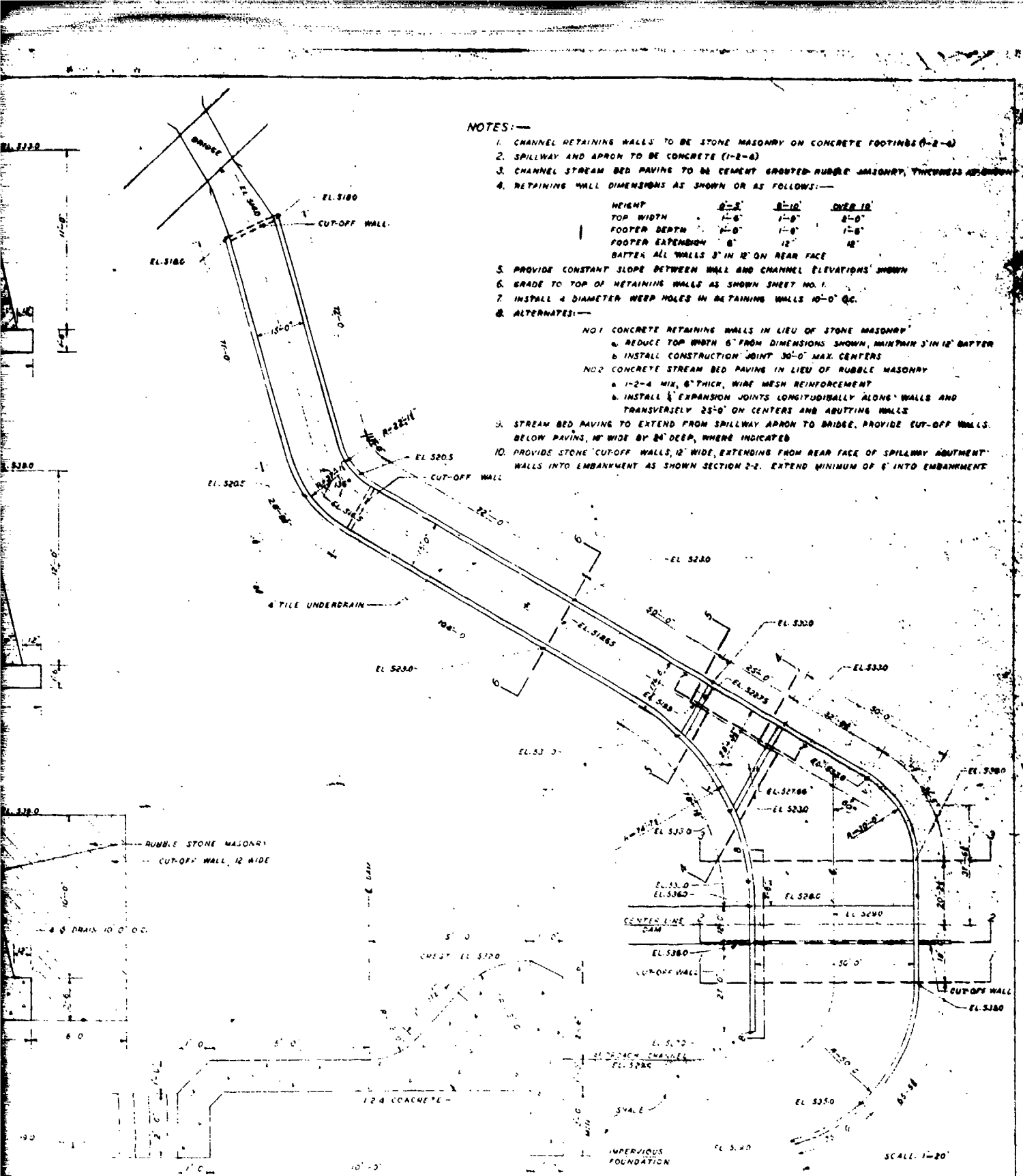
SECTION 3-3 SCALE 1/4"=1'



SECTION 2-2 SCALE 1/4"=1'



SECTION 1-1



NOTES:—

1. CHANNEL RETAINING WALLS TO BE STONE MASONRY ON CONCRETE FOOTINGS (1-2-4)
2. SPILLWAY AND APRON TO BE CONCRETE (1-2-4)
3. CHANNEL STREAM BED PAVING TO BE CEMENT GROUTED RUBBLE MASONRY, THICKNESS AS SHOWN
4. RETAINING WALL DIMENSIONS AS SHOWN OR AS FOLLOWS:—

HEIGHT	0'-5'	5'-10'	OVER 10'
TOP WIDTH	1'-6"	1'-9"	2'-0"
FOOTER DEPTH	1'-0"	1'-0"	1'-0"
FOOTER EXPENSION	6"	12"	12"

BATTER ALL WALLS 3" IN 12" ON REAR FACE

5. PROVIDE CONSTANT SLOPE BETWEEN WALL AND CHANNEL ELEVATIONS SHOWN
6. GRADE TO TOP OF RETAINING WALLS AS SHOWN SHEET NO. 1.
7. INSTALL 4 DIAMETER WEEP HOLES IN RETAINING WALLS 10'-0" O.C.
8. ALTERNATES:—

NO.1 CONCRETE RETAINING WALLS IN LIEU OF STONE MASONRY

a. REDUCE TOP WIDTH 6" FROM DIMENSIONS SHOWN, MAINTAIN 3" IN 12" BATTER
b. INSTALL CONSTRUCTION JOINT 30'-0" MAX. CENTERS

NO.2 CONCRETE STREAM BED PAVING IN LIEU OF RUBBLE MASONRY

a. 1-2-4 MIX, 6" THICK, WIRE MESH REINFORCEMENT
b. INSTALL ½" EXPANSION JOINTS LONGITUDIBALLY ALONG WALLS AND TRANSVERSELY 25'-0" ON CENTERS AND ABUTTING WALLS

9. STREAM BED PAVING TO EXTEND FROM SPILLWAY APRON TO BRIDGE. PROVIDE CUT-OFF WALLS BELOW PAVING, 18" WIDE BY 24" DEEP, WHERE INDICATED
10. PROVIDE STONE CUT-OFF WALLS, 12" WIDE, EXTENDING FROM REAR FACE OF SPILLWAY ABUTMENT WALLS INTO EMBANKMENT AS SHOWN SECTION 2-2. EXTEND MINIMUM OF 6' INTO EMBANKMENT

PLAN OF SPILLWAY CHANNEL

SPILLWAY SECTION

SECTION

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DAM

BALTIMORE SCOUT RESERVATION
BOY SCOUTS OF AMERICA
LEBANON CO. COUNCIL

SPILLWAY AND CHANNEL DETAILS

SCALE	DATE	DRW B	PROJ. NO 47-23
	1-15-47	CHK L	SHEET NO 3 OF 3
		APP. F	

11-28 4" STONE CUTOFF WALL ADDED BLF
11-28 4" TILE UNDERDRAIN ADDED BLF
11-28-47 STREAM BED PAVING DEPTH 12" TO 18" BLF

13

ETE FOOTINGS (1-2-4)

E MASONRY, THICKNESS AS SHOWN

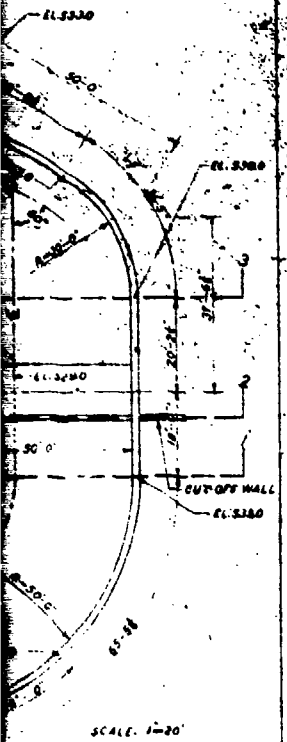
ER IS
0"
0"
0"

TIONS SHOWN

O.C.

NE MASONRY
SHOWN, MAINTAIN 3" IN 12" BATTER
CENTERS
RUBBLE MASONRY
CEMENT
LY ALONG WALLS AND
UTTING WALLS
AGE, PROVIDE CUT-OFF WALLS.

FACE OF SPILLWAY ABUTMENT
IMUM OF 6' INTO EMBANKMENT



SCALE: 1"=20'

L WAY CHANNEL

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DAM
OUT RESERVATION
UTS OF AMERICA
CO. COUNCIL

CHANNEL DETAILS

	DRW. B	PROJ. NO. 47-23
	CHK. L	
	APR. F	SHEET NO. 3 OF 3

PLATE V
PA-01011

4

APPENDIX F

GEOLOGIC REPORT

GEOLOGIC REPORT

Bedrock - Dam and Reservoir

There are two major rock units associated with the dam and reservoir. The dam and western portion of the reservoir are associated with the Devonian age Irish Valley Member, which consists of gray to red shales interbedded with fine-grained, fossiliferous, olive-green sandstones and siltstones. The eastern portion of the reservoir is associated with the Trimmers Rock Member of the Fort Littleton Formation. This member consists of gray, green and brown shales and siltstones with some sandstone and minor amounts of conglomerate.

Structure

There is a large fault apparently cutting diagonally northeast to southwest across the reservoir. It is named the Sweet Arrow fault and it is the largest and most prominant fault in the area. Subsurface seepage in this area is a distinct possibility because of the occurrence of this fault and its associated fracture zone.

Overburden

There are six major soil types associated with the dam, reservoir and immediate vicinity. The Berks shaly silt loam is located near the northwest corner of the dam and reservoir. This soil results from weathering products of the shales, siltstones and sandstones of the parent bedrock. To the northeast corner of the dam and reservoir lies the laidig channery loam which is colluvial in origin. This soil has a slowly permeable fragipan occurring at a depth of about 37 inches (0.9 m). On the west side of the reservoir lies the wiekert shaly silt loam. This soil is relatively thin, with bedrock usually encountered at about 18 inches (0.46 m). On the east side of the reservoir is the Buchanan gravelly loam which is also colluvial in origin. The Buchanan has a slowly permeable fragipan found at a depth of about 27 inches (0.68 m). At the south end of the reservoir lies the Atkin silt loam which is alluvial in origin and has an unconsolidated substratum. Directly to the north of the dam is the Bowmansville silt loam with a sand and gravel substratum.

Aquifer Characteristics

Due to the occurrence of a major fault, the rocks in this area could be potential aquifers. However, this is dependent on the extent of the fracture zone and localized lithology. Again, under these circumstances, subsurface seepage is a distinct possibility.

Discussion

With the apparent existence of the Sweet Arrow fault, the structural integrity of the rocks in this area is questionable. From the available construction plans, the dam core foundation was excavated to shale bedrock. If so, the rock may provide the necessary foundation base, although this does not eliminate the possibility of subsurface seepage.

Sources of Information

1. Pennsylvania Geologic Map Workshet - Indiantown Gap Quadrangle, 1980. Pennsylvania Geological Survey.

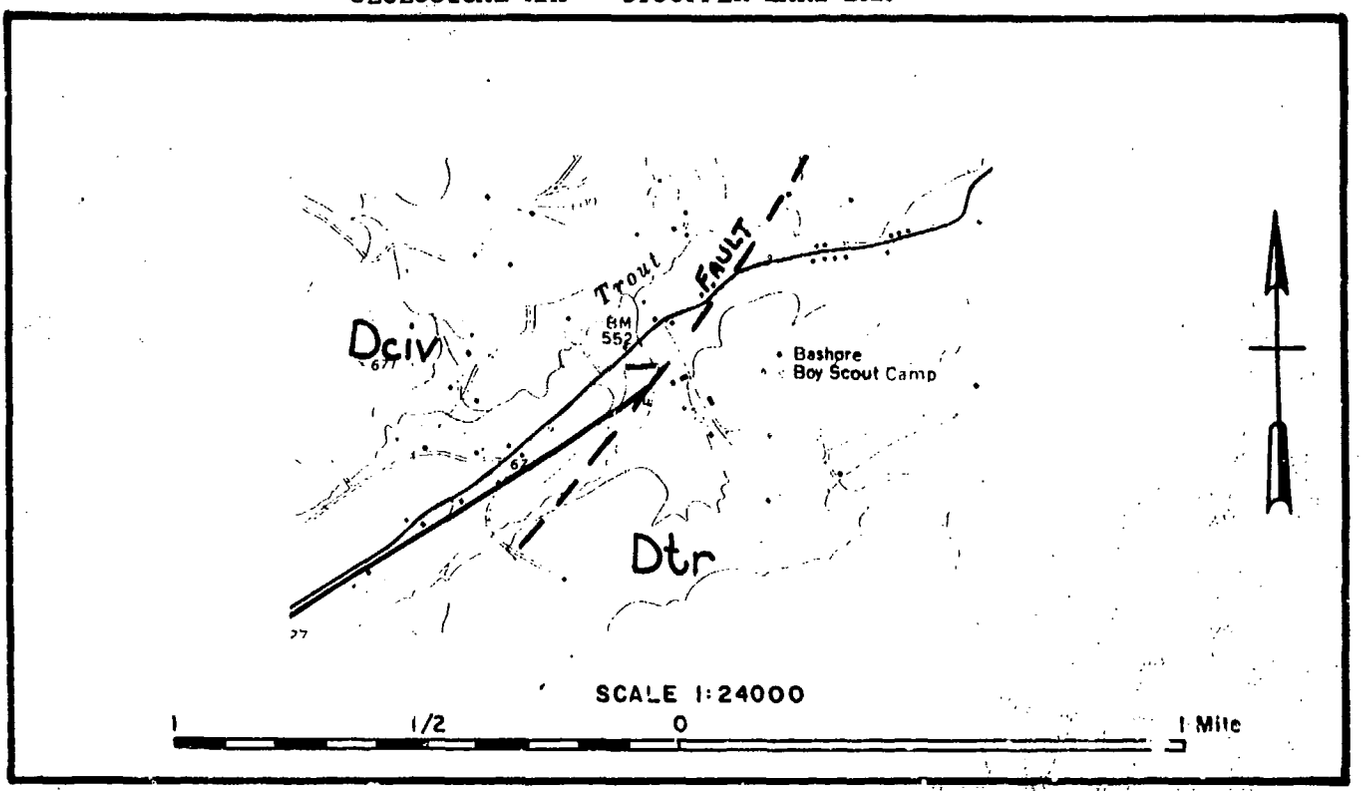
2. McGlade, W.G., et al., 1972. Engineering Characteristics of the Rocks of Pennsylvania, Pennsylvania Geological Survey EG-1.

3. Dyson, J.L., 1974. Newbloomfield 15' Quadrangle, Pennsylvania Geological Survey, A-137cd.

4. Soils Survey - Lebanon County Interim Report, 1980. Soil Conservation Service, U.S.D.A.

5. Personal Communication with David MacLacklan, Geologist, Pennsylvania Geological Survey.

GEOLOGICAL MAP - STOUFFER LAKE DAM



LEGEND

Dciv	Irish Valley Member
Dtr	Trimmers Rock Formation
	Sweet Arrow Fault